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PERMANENT HIGHWAY NUMBER 3, ALONG RIVER NEAR METALINE FALLS.

WASHINGTON'S STATE HIGHWAYS AND HIGHWAY DEPARTMENT

The Law Under Which the Department Acts and Its Practical Operation—The Honor System Use of Convict Labor—Work Done by the Department and Now Under Construction.

By WILLIAM R. ROY, State Highway Commissioner.

The problem of highway construction in the state of Washington covers a wide range of conditions, the state containing such diverse natural conditions as to bring about practically all the features experienced in the science of roadbuilding. The light soils of the eastern part of the state approximate the conditions encountered in the southwestern states, where natural soils are used extensively; the clays of the region west of the Cascades are similar to those encountered in the Mississippi valley, the home of the popular split-log drag; and the mountain region, the ruggedness of which is surpassed by no state in the union, requires the persistent efforts of the road-builder.

The paramount need of the state today is the development of a large mileage of well-located and constructed roads, which will be available to the traveling public throughout all seasons of the year. One of the aims of the highway department has been to assist in the development of such a class of road, the improvement ordinarily consisting, in addition to the grading and draining, of providing a satisfactory surface, consistent with an economical expenditure of the available funds.

During the two years ending April 1st, 1915, 254 miles of state highway were constructed. Since April, con-

struction has been started on 228 miles, and 39 miles more are being advertised for bids, which make a total of 267 miles that will have been constructed during the present season. The completion of this mileage of road will mean that more than \$1,000,000 will have been expended for materials and labor.

The mileage of new permanent highways authorized since January 1st, 1915, includes gravel, 112.6 miles; macadam, 29.1 miles; asphaltic macadam, 17.8 miles; bitulithic, 1.5 miles; asphalt, 1 mile; concrete, 23.8 miles.

The southern highway route across the state from Vancouver, in Clarke county, to Spokane, in Spokane county, will be completed this winter, the State Highway Commission having made provisions for the resumption of the work, for which the sum of \$57,000 is available. According to present plans, the Commission has decided to proceed with the construction of the 5½-mile stretch on state road No. 8, between Collins and Cook, on the Columbia river, the only unfinished link on the southern route to Spokane. The board intends to build the road by state crews instead of by contract, because it is considered dangerous and extra precautions must be practiced. There is a rocky hill to be blasted through, and beneath the right of way run two railway tracks. It is



CLEANING AND GRADING ON NATIONAL PARK HIGHWAY

expected that work will be started about October 15th. In the past, in order to traverse the southern border of the state, it has been necessary to ferry the river for a distance of about 5 miles at this point.

THE STATE HIGHWAY DEPARTMENT.

The Washington State Highway Department, as such, dates from the legislative session of 1905. Prior to that time various state highways and trails had been authorized by the Legislature as far back as 1893, but very little work of permanent nature was accomplished. The expenditures were made under the direction of persons designated by the Legislature, known as state highway commissioners, selected from the counties in which the work lay. A total of \$110,000 was appropriated by the state to be expended in this way.

In 1903 a law was passed creating the office of state highway commissioner, which was vetoed, and passed over the veto in 1905. This session also created the State Highway Board, to be composed of the state auditor, treasurer and highway commissioner, and appropriated the sum of \$134,000 for the construction of twelve certain designated state roads.

The 1907 legislature enacted the "State Aid Law," which provided for the construction of improved roads along main lines of travel, the cost of which was apportioned between the state and any county.

The Legislature of 1909 authorized the purchase of five rock quarries at various points in the state, and the construction of plants for the production of crushed rock for road-building purposes. An appropriation of \$124,000 was made to carry out this provision. The construction and operation of the plants was vested in the State Board of Control, and the distribution of the output was under the direction of the highway commissioner.

The operation of the state aid law was never attended with satisfactory results, and the law was repealed at the session of 1911 and the Permanent Highway Law was enacted in its stead. An appropriation of \$1,230,000 was made for permanent highways, in addition to the unexpended balances from the state aid fund. Owing to a deadlock in the 1911 Legislature, no appropriations for state road work were made, with the exception of the reappropriations necessary to complete existing contracts.

The Legislature of 1913 established the primary and secondary system of state roads, and made appropriations totaling \$1,971,000 for further construction of state highways. For carrying out the provisions of the permanent highway law, there was appropriated \$3,250,000.

The permanent highway law specifies that

The term "permanent highway," when used in this act,

shall be construed to mean an improved public road constructed along a main line of travel, either beginning at some trade center or an extension of an existing road of like character beginning at some trade center. Every permanent highway shall be uniformly graded to a width of not less than sixteen feet, shall have proper bridges, drains and culverts, and shall be surfaced with macadam, stone, gravel or other material equally as permanent and durable not less than twelve feet in width. No such highway shall be constructed with a grade exceeding five per cent, except where, by reason of physical conditions, it is not practicable to obtain such grade, but in no case shall any such highway be constructed with a grade greater than ten per cent.

The practical operation of the law may be briefly summarized as follows: An improvement is initiated by resolution of the Board of County Commissioners, either on their own motion or following a petition of the owners of two-thirds of the lineal frontage of lands along the road sought to be improved. A certified copy of this resolution is sent to the state highway commissioner, who, if the road designated is of sufficient importance to merit improvement under the provisions of the act, directs the county engineer, or a construction engineer



GRAVEL ROAD CONSTRUCTION, KING COUNTY.
Showing Kind of Guard Rail Used.

employed by the county board, to prepare plans and specifications, and estimate of cost of the improvement. These, after the commissioner's approval or revision, are formally adopted by the county commissioners and certified copies are filed in the highway commissioner's office. The county then advertises the work for three weeks, and awards the contract to the lowest responsible bidder, unless, in the opinion of the board, there is ground for the rejection of all bids, in which case the work must be readvertised. The contractor must submit a "lump sum" proposal for the entire work specified in the plans. The successful bidder must furnish a surety company bond in the full amount of the contract price. The contractor receives monthly partial payments of 80 per cent. of the value of the work done. The law provides that the highway commissioner shall cause the work to be examined on completion, and shall certify to the state auditor that the contract has been executed in accordance with the plans and specifications, before final payment is made. All estimates and vouchers in connection with the work are subject to the statutes governing the state auditor as to vouchers, and must be certified to by the engineer in charge, and approved by the county commissioners and the state highway commissioner.

The entire cost of the work, with the exception of the right-of-way and engineering charges, is paid from the permanent highway fund. This fund is raised by a mill and one-half tax on all property, collected in the same manner as are other state taxes. Each county is credited with the amount paid into the fund, and the money remains to the credit of the county until expended on con-

tracts or for maintenance. Five per cent of each county's credit is set aside for maintenance of the roads constructed under the provisions of the act and "similar roads."

In cases where a permanent highway improvement is initiated by petition of abutting property owners, a portion of the cost is assessed on such owners. The law specifies 15 per cent of the total cost as the minimum amount to be thus assessed, or such greater percentage as may be named in the petition. The property assessed is formed into an improvement district, in width not less than 660 feet nor more than three miles on each side of the road to be improved, and co-extensive with the length of the improvement. The district is divided into three zones of equal width on each side of the center line of the road; the first zone being assessed with a proportional part of seven per cent of the cost of the improvement; the second zone with five per cent, and the third zone with three per cent. The assessments are made on an area basis rather than the front foot basis.

In case the assessment plan is followed, the county pays the specified assessed percentage of each monthly payment to the contractor, from the general road and bridge fund; this fund being reimbursed when the assessments are collected from the property owners. The county commissioners may, in their discretion, permit the payment of these assessments in ten equal, annual installments, deferred payments bearing six per cent interest. When the payments are made in installments, the county commissioners may, if deemed necessary, issue six per cent bonds payable from the road and bridge fund, in an amount equal to the proportion of the cost of the improvement which is assessed.

The law as originally drawn in 1911 was slightly amended by the legislature of 1913 by placing all contracts on a "lump sum" basis, instead of giving the counties the option of calling for either a lump sum price for the finished work or unit prices on the various classes of work anticipated in each contract.

The highway commissioner is frequently called upon by county officers for advice as to choice of surfacing materials, road locations, design of structures, and has frequently been asked to act as an arbitrator in settling disputes between county officers and contractors. Assistance is also constantly being given in preparing specifications, proposal forms, etc.

The law sets aside five per cent of the permanent highway fund for maintenance work. This fund has been largely utilized, and the work of maintenance is being carefully done in most counties. At present this proportion is sufficient for maintenance, but it will undoubtedly have to be increased as the mileage of improved roads is extended.

The plan of assessing a portion of the cost of permanent highways is being followed with great success by four counties.

It has been the policy of the department to create a sentiment and an enthusiastic purpose among all the people to have good roads. It has been the aim to bring the department in closer touch with the road officials of the different counties, the highway departments of other states and counties, and the good road organizations, both local and national, in order that the practical efficiency of this department be brought to the highest state of perfection.

During the years 1914 and 1915 the department has conducted highway construction by day labor. The sections so constructed are the Olympic highway from Hama Hama river to Lilliwaup, in Mason county, a distance of 9.1 miles; the National Park highway from Mineral to Morton, in Lewis county, a distance of 7.0 miles; the Pacific highway from Kalama to Martin's Bluff, in Cowlitz county, a distance of 3.4 miles, less that portion completed by Honor Camp No. 2; and from Columbia River to Republic on State Road No. 4.

The sections being constructed at this time by day labor are: The National Park highway from Mineral to Morton, 6 miles; The National Park highway from



CONCRETE PAVEMENT ON NATIONAL PARK HIGHWAY, PIERCE COUNTY.

Alder to Elbe, 5 miles; State Road No. 18 from Morton to a connection with State Road No. 5, 5 miles; the Olympic highway from Shelton to Quilcene, 18 miles; the Olympic highway from East Beach to Piedmont on Lake Crescent, 3 miles; the Pacific highway, south of Bellingham, known as the Waterfront road (rock work), 5 miles.

The cook houses are conducted by the department at cost to the men and an average charge of \$5.25 per week for board pays all costs of construction, supplies, and labor in connection with the subsistence department.

Special effort has been directed to the sanitation of the camps and the excellent health of the personnel thereof has justified the effort. Laboring men appreciate plenty of wholesome food and a sanitary camp, and these factors have made it possible to secure and maintain first class labor on the work at all times. In addition to the excellent camp service, the men have been paid standard wages for eight hours labor per day.

The work undertaken by state forces and equipment has been without exception successful beyond expectations.

CONVICT LABOR.

State Quarries. Five rock quarries were constructed by the state during the period of 1909 to 1912. The general plan of construction is practically the same at all institutions. Owing to the prospective demand for crushed rock, the plan at that time was evidently to construct permanent plants. Where possible, all heavy machinery is set on concrete foundations. The bunkers, with the exception of Fidalgo, where water is the only means of transportation, are located so as to discharge by gravity directly into the railroad cars stored on the quarry sidings.

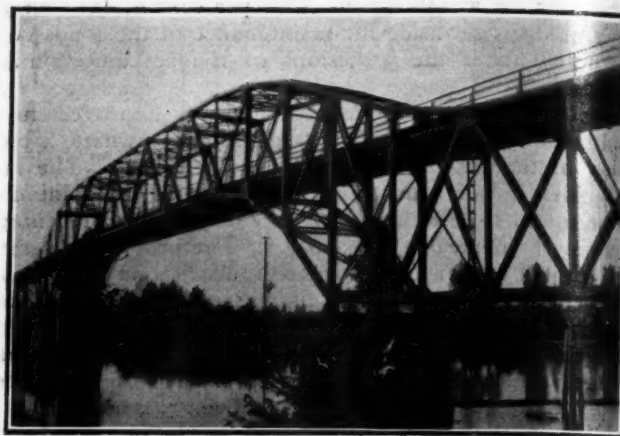
The main crushers are No. 6 Austin gyratory type and auxiliary crushers of the same type are provided to reduce the oversized material.

Electricity is used as the motive power at all plants, and each machine is driven by an individual motor. Air compressor plants provided power for the burley drills in all pits with the exception of Dixie, where coyote holes are driven by hand.

All buildings are of frame construction throughout with the exception of the power house at Fidalgo, which is covered with corrugated galvanized sheet iron. All camp buildings are well constructed, sealed, painted and electrically lighted. The quarters for the convicts are surrounded by a stockade, a portion of one side of which is formed by one side of the two-story building containing the office, commissary, and the free employees' quarters. The convict quarters are one-story structures and include two bunk houses, lobby, dining room, kitchen, pantry, laundry, meat house, drying room, dungeons, and, like the free employees' quarters, toilets and baths. In addition to the above mentioned buildings, superintendent's cottages of the same general construction are provided at Dixie, Selah, Marshall and Meskill. Water



BRICK PAVEMENT, PACIFIC HIGHWAY BETWEEN KENT AND AUBURN.



PACIFIC HIGHWAY BRIDGE OVER LEWIS RIVER.

under pressure is piped to all parts of the camps and sewer systems provide the necessary sanitation.

The quarries are self-sustaining institutions, there being no appropriations except a rotary fund, which is credited with the sale of all products from all institutions and from which all costs of operation, maintenance and improvements are paid.

When running at full capacity, a crew of seven free men and about thirty-four convicts are required to properly man the institution. The free crew consists of a superintendent, clerk, foreman, mechanic, and three guards. Two guards are required for the day watch and one for the night. The convict force is generally divided as follows:

Camp cooks.....	2
Laundry and camp men.....	1
Fuel and general.....	2
Blacksmith	1
Mechanic's assistant.....	1
Feeders	2
Drilling	2
Loading	1
Quarrying	20
Stripping	2

The operation of the quarries and control of the prisoners is under the control of the highway department and the institutions serve as parole camps for the convicts retained therein. A credit of one year's time is extended to the men for nine months' service.

The men are well fed, comfortably clothed, and provided with well equipped sanitary quarters. The quarters being surrounded by a stockade, the men are given the freedom thereof. At dusk they are confined to their quarters and permitted to pass the evenings in social amusements. At nine o'clock all lights within are extinguished.

In general, the men prefer to serve in the quarry rather than in the penitentiary, and the results of their labor show a marked degree of efficiency. During the past season the men in the pit at Meskill and Dixie have each placed in the crusher an average of ten cubic yards per day, and of this quantity it was necessary to reduce some by sledging to sizes adapted to the crusher openings.

The original plan followed in the construction of the five state quarries was to furnish rock at a low cost for the construction of state and state aid roads. The specifications being written by the highway department provided for the use of all sizes of rock in the proportions produced. Since the completion of the plants the state aid law has been abolished and the permanent highway law substituted in the place of same, and little surfacing has been done on state roads by the state. The permanent highway law places the construction of such roads under the control of the various county authorities. All quarries, with the exception of Fidalgo, are located along



BRIDGE CONSTRUCTED OF TIMBER HEWN ON THE SPOT.

the line of the Northern Pacific Railway, and that company tends a special rate of one cent per ton per mile for the first fifty miles, and $\frac{3}{4}$ of a cent per ton per mile thereafter until a rate of 75 cents is reached. For distances in excess of 100 miles a straight rate of $\frac{3}{4}$ of a cent per ton per mile applies, and \$5 is the minimum rate.

But even with this special rate, the transportation cost limits the zone in which the quarry product can be profitably used, and as an economic measure, many counties have installed their own crushing plants and are also surfacing with gravel.

The plants as originally designed each produced about 250 cubic yards per day in the following sizes and proportions:

No. 1—1½ inches to 3 inches.....	55 per cent.
No. 2—¾ inch to 1½ inches.....	25 per cent.
No. 3—Dust to ¾ inch.....	20 per cent.

Counties using the state quarry product have changed the constructive methods and use only a small proportion of the largest sized material. In order to prevent an over-production of the No. 1 stone and supply a maximum amount of the smaller sizes, the crushers' openings are closed and as much of the No. 1 and oversized material as possible recrushed. This operation, though producing more of the smaller sizes, reduces the output of the plant, and an average of about 200 yards per day, under such conditions, is a plant's capacity.

The average cost of subsistence per man per day is \$.268. The average cost of maintaining each convict per day, including guarding, subsistence, clothing, items of general expense, medical, escapes and transportation, is \$.74½, and the average cost of maintaining the institution per convict per day is \$1.83.

Cost of producing crushed rock fluctuates from 27c to \$1.50 per cubic yard. This wide variation is due to the ever-changing demand due to weather conditions. As the fixed charges of maintaining a convict institution are about constant whether operating or not, the cost of production during winter months, when the orders are small and spasmodic, is unavoidably high. The average cost of production during the past two years has been 54½c per cubic yard.

The selling price on No. 1 and No. 2 and No. 3 crushed rock is 60c, 70c, and 80c, respectively. Owing to the continual fluctuation in the cost of production it is necessary that some definite price be placed upon the product which, conforming to law, will average 10 per cent above the cost of production. The fixing of this price, therefore, resolves itself into a matter of judgment and subject to change if conditions warrant. From experience of the department, the centralizing of quarrying operations in large institutions, where deposits of road-building material are

located throughout the territory which would be supplied therefrom, is erroneous, even though favored by the special rates heretofore mentioned, as the zone of operation is limited when in competition with plants located near the work. Three of the plants are not operating at this time on account of this particular condition. Meskill plant, however, is very favorably located, and has proven its success from all points of view.

Highway Construction. Highways in the state of Washington have in five different instances been constructed by convicts laboring under guard, with various results and degrees of efficiency.

At the instigation of governor Ernest Lister, the construction of state highways by convicts working without guards under what has been termed the "honor system," was considered by the Highway Board on April 23, 1913, and on the following August 13th the highway commissioner was instructed to secure from 25 to 30 convicts from the state penitentiary to work on the Olympic Highway.

On September 10th, 1913, 30 honor men were placed in the first camp, one mile north of Hoodspoint. A second camp was established two miles south of Kalama on December 3rd, 1913, for the construction of a portion of the Pacific Highway, south from that city. Honor Camp No. 1, having completed the work assigned to it on the Olympic Highway, was transferred on July 14th, 1914, to Skamania county as Camp No. 3, for work on State Road No. 8, from Stevenson, west. On July 27th, 1914, Honor Camp No. 2 was likewise transferred to Stevenson, as Camp No. 4. Camp No. 5, composed of 72 honor men, has been recently established west of Waterville for the construction of a portion of the Sunset Highway from the Columbia river easterly through Coberly Canyon.

Honor System. The working of convicts on highways under what has been called the honor system is an experiment in which the state of Washington has operated with gratifying success.



OLYMPIC HIGHWAY, TEN MILES WEST OF OLYMPIA.

The thirteenth session of the Washington State Legislature provided for the working of convicts on state highways. This law provides that all convicts physically able and not otherwise employed, may be employed upon the construction of highways, and that the state highway commissioner shall, when possible, use such persons in the building and repairing of public roads.

Upon requisition from the highway commissioner, the Prison Board of the State Penitentiary selects such convicts as they may deem eligible and worthy of consideration for service in the honor camps. When criminals are sentenced to the State Penitentiary they are given a minimum and a maximum term of servitude as provided under the "Indeterminate Sentence Law," and it is the object to select convicts whose minimums have expired or will expire while at the camp or those whose conduct at the penitentiary deserves special consideration.



STATE ROAD NO. 8, APPROACHING GOLDENDALE.

Each convict signs a pledge of honor that for and in consideration of the clemency extended by the Governor and the State Prison Board in permitting him to work in the honor camp and the payment of fifty cents for each day's labor, he agrees to perform such work as may be assigned to him, obey the rules and instructions, and not to leave the camp without special permission from the camp superintendent. This pledge also provides that the wages earned prior to final release, except necessary incidentals and tobacco, shall be withheld until discharged, the date of discharge being stated therein. Special permission, however, is given to contribute part or all of his wages to his wife or children.

Upon the acceptance of the conditions of the pledge, the Governor issues a conditional pardon to each man which sets forth the conditions governing his conduct while at the camp prior to the issuing of his final pardon, and the man is ready to be transferred to the honor camp.

Camps and Employees. All camps have been of a light frame construction, with the exception of the men's quarters at Camp No. 1, on Hood's canal, where tents were provided. Owing to the dampness of the climate during the winter months, the use of tents for quarters has been abandoned. In addition to the fifty cents for each day's labor, the men are fed, clothed, and sheltered in sanitary quarters at the expense of the state.

All employees of the camps are honor men with the exception of the superintendent, his foremen and such special skilled labor as is necessary to carry on the work to the best advantage. The camp clerks are also free men with the exception of Camp No. 4, where an honor man was used to advantage, as both Camps No. 3 and No. 4 were under the same general superintendent.

The disposition of the honor men toward the system is, in general, very favorable. The freedom of the camp and

life in the open appeals to them and many do not hesitate to express their appreciation of the opportunity that has been extended them. There are exceptions, however, and some in their weakness have yielded to freedom's temptation, failed to uphold their honor and deserted the camps and others have shirked their duty and have been returned to the Penitentiary. The disposition to fulfill the conditions of the agreement under which these men are placed in the camps is entirely within each individual's control, and without the restraint of any kind of guard. The results to date show that a comparatively low percentage have failed to uphold the trust placed in them, as 274 honor men have been placed in the various camps, and of that number but 3.65 per cent have deserted, 3.65 per cent have been returned to the Penitentiary as undesirables, and 0.73 per cent returned to the Penitentiary for medical attention.

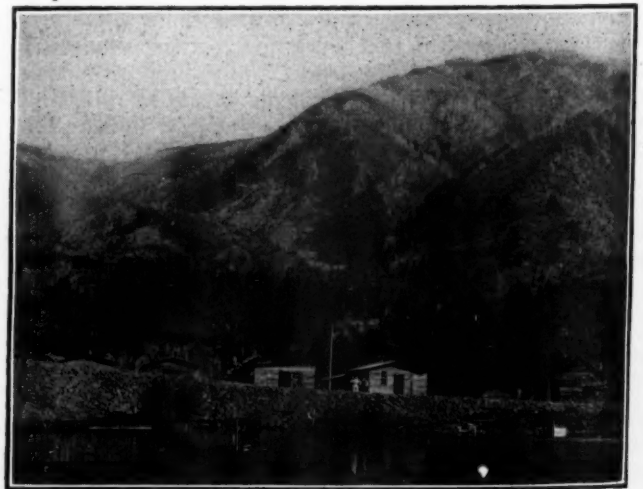
Limiting Factors. There are many conditions which tend to limit the practical use of convicts in the construction of highways and some of them are entirely out of the control of man. The case where all conditions were favorable at any one time would indeed be an exception.

In the first place, the construction must be of such a nature that hand implements may be used to the best advantage, as the state does not own stock for grading purposes, and only a small amount, if any, stock can be hired without the accompanying free labor.

Owing to the time and expense of transporting the men to and from the penitentiary, it is necessary to keep them on the work when once established in the camps, and as the cost of maintenance is a fixed factor whether the men work or not, the question of climate becomes a primary point for consideration.

Superintendents and foremen with proper constructive knowledge and ability to direct free labor, are, in general, not versed in the management of convicts and those capable of the management of the convicts are not acquainted with constructive methods.

The efficiency of the men depends largely upon their



"HONOR" CAMP (CONVICT) ON STATE ROAD NO. 8.

discipline and the spirit with which they enter into the work, and it has been observed that these factors vary proportionately to the camp's distance from settled communities.

A large percentage of the honor men are not of the laboring class nor accustomed to such work as is demanded of them in highway construction, and it would, therefore, be an injustice to expect the same degree of efficiency as from selected free labor.

Surrounded by these unfavorable elements, it has been the aim to give the system a most thorough trial. The

work at all camps for a large portion of the time was carried on under the most unfavorable conditions and has given the experiment a most severe test.

The work of Honor Camp No. 1, on the Olympic Highway, during the winter months was the most severe test, being carried on under the most unfavorable conditions—conditions which no contractor would have ventured to face. The road is located on the steep mountain side just above high tide along the west shore of Hood's canal. The excavation work during the winter months was entirely in earth. The earth, which is classified as common excavation, is a material composed of a mixture of soil and gravel, resting on a cemented gravel or hardpan foundation, which slopes towards the road and water's edge. Owing to the porous nature of the soil and the impervious foundation below, a large amount of surface water is retained, thus causing many slides. During the winter months these slides were a continual source of expense. Great quantities of soft earth intermingled with trees, stumps, and brush would come down on the road, and in some instances destroy the finished roadbed.

When the conditions would permit, the men worked even though it rained, with comparatively little ill feeling toward their position. At times the material became so soft that it would run from the shovels and resemble mortar more than earth and the men sank half way to their knees in the mire. During the month of January it rained continuously for twenty-five out of twenty-seven days and working under such unfavorable conditions, the best of efforts accomplished but little, much time neces-

sarily being lost. As the cost of maintenance was a constant factor, the result for the winter season was a poor showing for the money expended when compared with the results of the summer months or with contractor's work executed during the summer season. As wet weather does not interfere with rock excavation as much as earth work, the unit price would have been materially reduced had it been possible to work such material during the winter months and leave the earth work for the dry summer season.

The estimated efficiency of convict labor as reported by the various states where same is employed varies according to the location. The highest efficiency appears to exist in the southern states, where negroes who are accustomed to manual labor are used exclusively, and the long, mild seasons permit continual operation. However, owing to the lack of a standard method of accounting in the different states, a wide variation in the results is noted, and it is impossible to make a comprehensive comparison.

Some of the detail costs under the Washington honor camp system are:

Subsistence per man per day.....	\$0.41
Equivalent wage per day (including clothing, medical, transportation, subsistence, items of general expense, bedding, etc., and 50c cash wages).....	1.44

Convict labor on highways has cost about the same as contracted work, but the state has profited financially to the extent of their maintenance at the penitentiary and society has profited morally.

OREGON'S STATE HIGHWAYS

Two Years' Work of State Highway Commission—Two Main Arteries Across the State are Planned—Three and a Half Millions Spent Under Its Supervision—Aims of the Commission.

By H. M. WHITE.

When the Oregon Legislative Assembly in 1913 created the State Highway Commission it set the wheels in motion for a great system of permanent roads and highways. In the two years since the commission has been in action, Oregon has done more toward a permanent highway system than in all the rest of the history of the state.

The commission itself has spent state funds amounting to about \$475,000. In addition, it has supervised or engineered the expenditure of probably \$3,000,000 spent by counties, and before the end of the present year will have supervised work costing probably \$1,000,000 more. Outside of what has been spent under state aid or supervision, there has been spent for permanent roads of a local nature, including paved streets in Portland, in excess of \$4,500,000, making a grand total for the state of more than \$9,000,000 in two years. This jumps the total since 1903 up to about \$22,000,000 for the state. This grand total includes considerable expenditures for macadam roads constructed principally before 1914. These are now being replaced with hard-surface roads.

The State Highway Commission comprises Governor Withycombe, State Treasurer Kay and Secretary of State Olcott. It has an advisory board of citizens comprising S. Benson of Portland, chairman; Leslie Butler of Hood River and J. H. Albert of Salem. The commission was created for the purpose of encouraging and promoting highway improvements throughout the state and to advise through its engineer, county officers and others in matters pertaining to construction, repair, alteration and maintenance of highways, bridges and culverts and to furnish

such other information and advice as might be requested by persons or officials interested in highway development.

The act creating the commission provides that its engineer shall upon request act in an advisory capacity to the boards of county commissioners and shall recommend such types of construction as will be practical for their localities and give such other information and assistance as may be necessary in individual cases. The engineer is also required to collect information and compile statistics relative to the mileage, character and condition of the highways and bridges throughout the state. Arrangements may be made for making inspections, location surveys and foundation tests in cooperation with the county engineers and for supervision of construction of bridges and highways.

The commission is empowered to construct or cause to be constructed such state roads as in its judgment seem to be for the best interests of the state. An effort is being made in this connection to so lay out the roads that they shall lead into or towards the chief market centers and connect with, so far as possible, the main county roads of the state. The commission may employ convict labor in this work. These state roads, the commission act provides, are to be improved and maintained at the cost of the state and planned so as to eventually become a part of a predetermined highway plan and so coordinated as to form a system of trunk highways throughout the state. The law provides for a one-quarter mill tax per year as a state road fund. This raises a total of \$237,300 a year on the present assessed valuation.

In working out its plans, two big main arteries have

been centered upon, one, the Columbia River Highway and the other, the Pacific Highway. The one traverses the state from Eastern Oregon down along the Columbia River through the Cascade range of mountains to the Pacific ocean. The other courses the state in the other direction, passing from the Washington line south through Portland and into California. This highway ultimately is planned to lead from British Columbia to Mexico, passing through Washington, Oregon and California.

In addition to these main arteries, the state has done a large amount of work on smaller state roads and has contributed to various counties in both funds and advice on their more or less local roads. On the Columbia River Highway the state has spent \$111,700 and on the Pacific Highway, \$77,600. It has given about \$285,000 to various counties for roads and bridges of a local nature.

By far the biggest undertaking so far is the Columbia River Highway. It extends a distance of 215 miles from Biggs, Oregon, down along the Columbia river to the sea, but the main development to date has been between Biggs and Wasco and from Hood River to Astoria. In this stretch the principal work has been done in Multnomah county, where \$464,000 has been spent in grading and where several hundred thousand dollars is being spent this summer in paving.

Extending through a wonderfully picturesque country over a course that could hardly be more rugged, this highway, 24 feet in width, presents a remarkable study in engineering. A most notable feature is the construction of a tunnel at Oneonta gorge. The highway crosses the stream on a reinforced concrete bridge and passes at once into a tunnel 125 feet long. On account of the natural



BRIDGE ON COLUMBIA HIGHWAY, NEAR LATOURELL.

conditions, only 18 feet of rock could be retained to support the cliff adjacent to the main line tracks of the Oregon Washington Railroad & Navigation Company which follow along beside the highway. In order to insure safety, many large fissures in this 18-foot wall were filled with concrete.

Another bit of novel construction is a bridge and tunnel at Mitchell Point on this same highway. After passing over a concrete viaduct 192 feet long the road enters a tunnel 420 feet long through rock. This tunnel is driven 10 feet from the face of the cliff and at intervals openings 18 feet wide and 16 feet in height are cut through the rock wall providing an unobstructed view of the Columbia river. This work required exceptional care and skill in blasting, as a main line railroad track passes by the cliff about 80 feet below the level of the tunnel. This part of the highway cost approximately \$60,000.

Still another remarkable piece of engineering is found near Crown Point, where the road almost encircles a point of rock standing 700 feet straight up from the floor of the valley. The road fits the top of this rock like a hat rim and circles through 225 degrees as it curves on a radius of 110 feet. A seven-foot concrete sidewalk and curb are built along the outer side of the road. A four-foot wall of concrete on the outer edge protects all who use the road. The length of this wall is 560 feet.

Grading of the highway has been finished to the Hood River county line. A contract has been let for the paving, this work to be done during the present summer. It will be paid for out of an issue of \$1,250,000 in road bonds authorized early in the spring by the voters of Multnomah County. The remainder of the bond issue will be used this summer for paving 30 miles of county macadam roads leading into Portland. This work now is under way. In all the bonds will provide for 70 miles of paved country roads in and near Portland this summer. Street paving within Portland limits this year will aggregate over \$1,000,000 in addition.

State aid on the Columbia River Highway has been divided as follows:

County	State appropriation	County appropriation
Multnomah	None	\$464,000
Columbia	\$19,200	283,000
Clatsop	53,700	289,400
Hood River	5,800	75,000

A large amount has been spent on the Pacific Highway, also, and Oregon, through efforts of the Highway Commission and the officials of the various counties, has made this road a marvel. Where up to eight months ago there was almost one continuous mire for dozens of miles, there now is a fine road suitable for travel the year round. The heaviest work on this was in the Cow Creek



MULTNOMAH FALLS, ON COLUMBIA HIGHWAY.



CONCRETE ROAD IN SOUTHERN OREGON.

canyon in the Siskiyou mountains in southern Oregon. Here a road was put through the most rugged sort of mountain country, where a great many bridges were required. Part of the road through here now is paved and

Highway Commission it has been realized that first class roads cannot be built with inferior materials and careful preliminary and control tests have been made on all materials entering the work. All steel work has been subjected to both mill and shop inspection.

For the commission the future is very uncertain because of political difficulties which have bothered up to this time. However, road work with state aid is not to be discontinued. Realizing the benefit of a real cooperative system of road construction, the counties are relying more and more on the state and its department.

E. I. Cantine, state highway engineer, has the following to say about the future: "An earnest effort is to be made to promote intimate cooperation with the U. S. Department of Agriculture, Office of Public Roads, the officials of the various counties and the public. This will not only result in an efficient system of roads but will effect a great saving in road expenditures; as every mile of road will be so planned and constructed as to become eventually a part of a predetermined system of trunk and lateral

Type	How constructed	Length, miles	Hard Surface Roads Built by State Aid.				Cost per mile		County
			Width of roadway	Thickness	Width of paving	Width of grading	grading	paving	
Concrete	State forces	9.5	16 ft.	5.68 in.	16 ft.	24 ft.	\$2,200	\$13,842	Jackson
Asphaltic concrete	Contract	4.3	16 ft.	5 in.	16 ft.	24 ft.	1,964	12,279	Jackson
Concrete	State forces	3.0	8 ft.	6 in.	8 ft.	(none)	(none)	8,240	Clatsop
Warrenite	Contract	2.0	9 ft.	Standard on old macadam	9 ft.	(none)	(none)	8,333	Clatsop

all is at least made suitable for travel in winter as well as summer.

Jackson county put \$380,500 into the highway, and the state spent \$52,600 within Jackson county on this highway. Josephine county put up \$5,000 and the State \$5,000, and Douglas county \$20,000, and the state \$20,000.

Outside of the appropriations for these two highways, the state has given aid in counties on smaller roads. It has given \$50,000 to Columbia county; \$35,000 to Clatsop; \$50,000 to Hood River; \$50,000 to Jackson, and smaller amounts to various counties.

To date there has been designed and built under the supervision of the State Highway Department 21 steel bridges aggregating 1,000 tons of steel at a cost of \$137,000, including approaches, and 16 concrete bridges at a cost of \$105,000. Large grading projects have been supervised by the state in addition to the work on the Pacific and Columbia River highways. Twenty-six miles were graded on the Nehalem highway; 12 miles of the Mist-Clatskanie highway; 30 miles on the Astoria-Vesper highway.

The above table shows the amount of hard surface built by state aid.

The above costs include the construction of 4-inch crushed rock shoulders on each side of roadway and all expenses, such as overhead, depreciation, etc.

Following are figures showing grading put through by state aid:

Name of road	Miles	County
Siskiyou Mt. section	13.5	Jackson
Columbia River highway (Astoria to Westport)	28.0	Clatsop
Seaside-Tillamook	15.0	Clatsop
Astoria-Vesper	30.0	Clatsop
Columbia River highway	38.0	Columbia
Mist-Clatskanie	12.0	Columbia
Nehalem highway	26.0	Columbia
Pittsburg-St. Helens	24.0	Columbia
Columbia River highway	22.0	Multnomah
Biggs-Wasco	9.0	Sherman
Columbia River highway	22.0	Hood River

In connection with all the work performed by the



ON THE COLUMBIA HIGHWAY. Fine Sample of Dry Wall Construction.



TUNNEL ON THE COLUMBIA HIGHWAY.

highways, built in accordance with most approved practice.

"While it is true that public roads should be so constructed as to serve traffic within the county which builds them, the cooperative plan as proposed will enable location to be made in such a manner that they will serve both local and through traffic, as the two uses are

in no way conflicting. Before deciding to include any section of road in the system, a general idea will be obtained as to the practicability of its construction at a reasonable cost and whether or not the road will be the best one to build from the standpoint of the welfare and development of the communities through which it passes.

"It is the intention to issue from time to time reports and bulletins dealing with matters of public interest and every effort will be made to give the public opportunity to cooperate with the commission in its various activities, in order that progress may be made toward intelligent and economical administration of public roads and that active movement toward road betterments may be placed on sound business considerations and administered with all the business care and efficiency and all the technical skill that would be employed if they were owned by private corporations. The plan of informing the public on road matters in general and to familiarize those interested in details of construction and cost will, with the cooperation of the public press, develop proper public opinion in such matters and it is hoped that within a comparatively short time the vital matter of road development will become a function the execution of which is in accord with approved engineering practice and modern business methods."

What particular projects will be undertaken in the future is uncertain yet. It is the opinion, however, that the state will continue to give substantial support to small counties crossed by the two main highways and will contribute as strongly as possible to the local roads of these and other counties. It remains for the highway commission to work out the actual plans and this has not been done as yet for next year. During the present year the state will confine its efforts to work already under way. By the end of the year the money raised by taxation will have been spent.

CALIFORNIA HIGHWAY COMMISSION'S WORK

Nearly Nine Hundred Miles of Roads Paved in Three Years—Concrete and Asphaltic Oil Used—Three Thousand Miles in State Highway System, Eighteen Hundred in Trunk Lines

By AUSTIN B. FLETCHER, State Highway Engineer.

The California state highway work has been in progress since the spring of 1912, the funds being provided by a bond issue of \$18,000,000 voted by the people.

The highway act provides for the construction of approximately 3,000 miles of state highway, about 1,800 miles of which may be called trunk lines and the remainder laterals.

There has been no rigid standard of pavement adopted by those in charge of the work. The type and width of pavement have been selected to fit the traffic needs for the locality.

The trunk lines have seemed to require rather expensive paving, and as the work has progressed it has become more and more evident that the \$18,000,000 will not be sufficient to complete the system in a satisfactory manner.

The Legislature at its 1915 session became convinced of this fact and provided for a bond issue election to be held in November, 1916. At that time the people will vote on a new issue, \$15,000,000 in amount, to be used to complete the system outlined in the present State Highways Act, and to round out the scheme by the construction of certain connecting roads not contemplated in the present law.

The work is administered by a committee of the Advisory Board of the Department of Engineering com-

posed of Messrs. Charles D. Blaney, Chairman; Newell D. Darlington, and C. Frank Stern, known as the California Highway Commission. Austin B. Fletcher, highway engineer, is the executive officer in charge of the work.

The following table shows the mileage and types of the state highways under contract or completed. The cost per mile given is approximate and exclusively of engineering and overhead expenses:

Type	Mileage	Cost per mile
Grading	305.9	\$8,970.00
Concrete base, thin bituminous wearing surface	800.4	9,920.00
Concrete base, sheet asphalt wearing surface	20.9	18,500.00
Oil macadam	19.1	6,850.00
Macadam base, Topeka wearing surface ..	16.5	14,900.00
Waterbound macadam	12.9	10,950.00

The concrete base with the thin bituminous wearing surface has proved to be a very satisfactory type of construction for much of the main or trunk lines.

The wearing surface is about $\frac{3}{8}$ of an inch in thickness and is composed of heavy asphaltic road oil and screenings. The oil used contains about 90 per cent of 80 penetration asphalt and conforms to certain specified limits in viscosity and adhesiveness. The screenings used are crushed rock or fine gravel which will pass a $\frac{1}{2}$ inch

mesh screen and from which substantially all the dust has been removed.

Due to the great care exercised in cleaning the concrete base prior to the application of the bituminous wearing surface, these pavements have given but little trouble due to the bituminous surface peeling or breaking loose from the concrete base. The oldest of this surfacing has been under heavy traffic for nearly three years and has required but little patching. It gives promise of an average life exceeding four years before complete renewal will be necessary.

The California state highways have not been built long enough to furnish sufficient data for estimating yearly maintenance cost.

Additional information concerning the highway work of the state has been abstracted from the report of the State Department of Engineering for the year 1914, and is given below.

There are two distinct systems of public highways being acquired by the state of California. One dates back to 1895 when the legislature declared the road from Placerville to the state line near Lake Tahoe to be a state road; the other had its inception in 1910, when the people voted \$18,000,000 with which to construct a system of highways throughout the state. For convenience in distinguishing the two systems, the roads built under the highway bond act are designated as state highways, while the other class is referred to by the Department of Engineering as state roads.

The system of state roads began with the acquisition of the Placerville-Lake Tahoe road and has been gradually extended from time to time by the taking over to state control of county roads and the building of new roads in the mountainous regions where the construction and maintenance of roads for free travel would be beyond the financial abilities of the counties. The system now embraces eleven roads, each of which was created by a special act of the legislature and bears the name designated in the act creating it. These eleven roads are situated in thirteen different counties and aggregate about 550 miles in length.

Most of the names of these roads are long and cumbersome, several being compound and far from euphonious, while some are misleading as a designation of locality. Several of them traverse localities wherein were enacted much of the romance and tragedy of California's early history and might appropriately bear names commemorative of such events. About three years ago a bill, giving names as suggested above, was introduced into the legislature but failed to become a law.

With the proceeds of the \$18,000,000 bond issue the state has undertaken to construct and maintain a system of state highways distinct from the state roads referred to. For this purpose the state is divided into seven road districts, each under the charge of a division engineer, who works under the supervision of the state engineer.

A large force of engineers and office employees have been engaged in making surveys, locations and plans, and at present more than 750 miles have been completed under standard specifications and about 425 additional miles are under contract. The types of roadway adopted vary according to the conditions encountered and were selected after taking into account considerations of cost, durability and service. Bridges and culverts of substantial design have been built.

So satisfactorily has the work proceeded and so definitely has the plan been advanced for principal routes through the San Joaquin and Sacramento valleys and along the coast, that last year much time was given to studies of the secondary routes, which will connect

mountain and other county seats not on the through lines.

The main routes have now assumed definite shape in all parts of the state, extending from Crescent City and Eureka on the northern coast to San Francisco and through San Luis Obispo and Santa Barbara to Los Angeles and San Diego; and in the interior, from the Oregon line, via. Yreka, Redding, Red Bluff and Marysville, to Sacramento, thence through Fresno and Bakersfield to Los Angeles. The cities on the west side of the Sacramento valley, those between the San Joaquin valley and Santa Cruz, and the principal sections of southern California also have roads laid out for improvement, with construction already provided for.

Definite figures are not yet available showing the progress in 1915, but up to December, 1914, 136 contracts had been initiated by the department and the following progress made:

	Miles
Surveys made and plans in various stages of preparation	2,150
Layouts made (154)	1,164
Contracts advertised or awaiting award	47
Contracts let, including certain day labor work (136)	987
Work completed and accepted	320
Work completed but not yet accepted	300

Of the 987 miles of work under contract a division may be made by types of construction as follows:

Type	Miles
Graded only (to be surfaced under future contracts)	266.0
Macadam with thin bituminous carpet	7.6
Oil macadam	24.4
Cement concrete with thin bituminous top	650.1
Macadam with thick bituminous top	16.5
Cement concrete with thick bituminous top	19.1
Timber and concrete trestle	3.1

Total 986.8

The principal items of the completed work have cost the state approximately as follows on the first 211 miles of highway completed and accepted:

Excavation, regardless of classification	\$0.44 per cu. yd.
Concrete, in structures	12.60 per cu. yd.
Concrete in pavement bases	5.93 per cu. yd.
Asphaltic concrete wearing surface 1½ in. thick	0.54 per sq. yd.
Thin bituminous tops, ¾-in. to ½-in. thick	0.09 per sq. yd.

The state highway system comprehends approximately 3,000 miles of improved roads to comply with the law, and of these, 1,800 miles are included in the main routes. These latter are to be paved, while the lateral or feeder roads will be surfaced with gravels or other relatively inexpensive native materials. Construction is governed on the line of the following principal characteristics of the roads built: (1) A right of way not less than 60 feet in width, where it is reasonably obtainable, and as direct between objective points as is consistently possible; (2) gradients not exceeding 7 per cent, even in the mountainous parts of the state; (3) curves as open as possible and in no case of less than 50 feet in radius; (4) as many culverts of sufficient capacity as are needed to take care of surface and underground water; (5) a



BUILDING CALIFORNIA STATE HIGHWAY IN FOREST.

traveled way, under ordinary conditions, not less than 21 feet in width, and in the mountains not less than 16 feet wide, with the center paved or surfaced so as to be hard and smooth under all climatic conditions at all times of the year, the width of surfacing to be in general 15 feet; (6) smoothly graded roadsides, reserved for future tree planting.

The policy as to paving was established at the outset in a decision to adopt a type of paving that would accord with the traffic needs of the locality served; instead of a rigid standard, local conditions were met by varying types, thereby saving waste of money through unnecessarily high first cost or great maintenance charges. Three types of pavement are possible under conditions in the state: (1) oil macadam pavement (penetration method); (2) concrete roadway with a relatively thin bituminous wearing surface; (3) concrete roadway with a thick bituminous top of asphaltic concrete. (Descriptions of the methods of constructing California state highways will be found in *Municipal Journal* for August 6th, 1914, and April 1, 1915.)

California is fortunate in its production of paving materials, and this has aided materially in state highway construction. This is especially true of the wearing surfaces, for the vast supply of California oil with an asphaltic base has made possible the adoption successfully of the bituminous coverings for the pavements of its highways. The earliest work of this sort laid by the commission was placed near Fresno, where it has been under constant and heavy traffic for nearly three years with hardly any wear appreciable and with almost no need of attention for repairs. It gives every indication of a life of at least four years before repairs will begin to be necessary.

An experience of more than two years has likewise demonstrated the suitability of a concrete base of four

inches in thickness where the subgrade is firm and hard or can be made so and likely to remain so; and in most cases where the traffic is normal, with a daily volume of up to, say, 500 to 600 vehicles, the four-inch cement concrete base with a bituminous top of one-half to three-eighths inch in thickness is being constructed. If the concrete is laid over adobe or other bad material, the base is thickened to five or six inches. The width of the paving is generally fifteen feet, exclusive of the shoulders. Where the traffic is very great in volume, as on the peninsula south of San Francisco, the paving is made wider, from twenty to twenty-four feet, and the wearing surface is thicker, ordinarily one and one-half inches of asphalt or asphaltic concrete.

By an act of the legislature passed in 1913, the Department of Engineering was required to register all automobiles and motorcycles, their owners or operators and all chauffeurs, and to issue licenses therefor. The fee for motor vehicle licenses varies in amount according to the rated horsepower of the engine, as follows:

For less than 20 horsepower	\$5
20 to 29 horsepower, inclusive.....	10
30 to 39 horsepower, inclusive.....	15
40 to 49 horsepower, inclusive.....	20
50 to 59 horsepower, inclusive.....	25
60 horsepower and over	30

The fee for motorcycles is \$2 and for chauffeur's licenses \$2. All licenses are renewed at the same fee each year. The collection of the fee is delegated to the state treasurer. The receipts from motor vehicles are more than \$1,000,000 annually, a portion of which is used for highway maintenance work. The maintenance organization for the state highways was initiated in 1914 and has been established in all seven divisions of the state. Last year about \$350,000 was expended in maintenance.

WATER AND SEWER MAINTENANCE IN NEW ORLEANS

How the Force Is Organized and the Work Conducted in Making House Connections, Installing Meters and Maintaining the Systems Generally—Relaying Pavements—Supervision of House Plumbing.

House connections to both sewers and water mains in New Orleans are made by city employes, a separate sub-department being provided for sewer house connections with an assistant engineer in charge, and one for water house connections with another assistant in charge. There is also a sub-department of sewer maintenance and one of sewer extensions, each with a general foreman in charge; also sub-departments of water main extensions and water maintenance, each with an assistant engineer in charge. There is also a supervisor of plumbing to oversee the work done within the property lines by the private plumbers. In addition, forces are employed under an office engineer in charge to relay pavements disturbed by the board in the construction and maintenance of the sewer and water systems.

During the year 1914 from four to seven foremen, each in charge of three gangs of three men each, were engaged in laying sewer house connections. Each set of three gangs was served by a two-horse wagon for the transfer of tools and the delivery of material. One head clerk, two general clerks and one Y record clerk were employed in the office. These forces installed 8,522 house connections during the year, and also readjusted 22 house connections on account of new underground structures. They also built 124 feet of 8-inch sewer, including one manhole.

The sewer maintenance force cleans, maintains and repairs the sewers, and during 1914 had 876 miles of

sewers from 8 inches to 84 inches in diameter, 6,660 manholes, 1,937 flush tanks and 40,506 house connections under their charge. The force regularly employed consisted of two foremen, each with a two-horse wagon and six laborers, and three men operating flush tanks and flush manholes. One additional foreman with a gang of laborers was engaged in rearranging sewers on account of drainage construction and in making repairs to damaged sewers. During the year this force cleaned 151 house connections, dug up 58 house connections for repairs, cleaned 8,940 blocks of sewers, operated 4,308 flush tanks and flush manholes, repaired or rebuilt 37 manholes, readjusted 350 manhole castings to grade and changed 5 others, changed 172 manhole covers, repaired 69 flush tanks and 56 flush tank valves and replaced 129 flush tank valves. In addition it took up and relaid, or replaced with larger pipe, sewers from 8 to 24 inches in diameter totaling in length 9,930 feet, and built 36 manholes and 7 flush tanks.

The force on water house connections consisted of one general foreman and three foremen, each with a two-horse wagon and a gang, each gang consisting of a plumber, a tapper and from four to six laborers. There was also an office force of one head clerk, two general clerks and one stenographer, the last also assisting in other clerical work for the department. All water services and meters from 5/8-inch to 1 1/2-inch were installed by these forces. Cast iron services and meters from 2

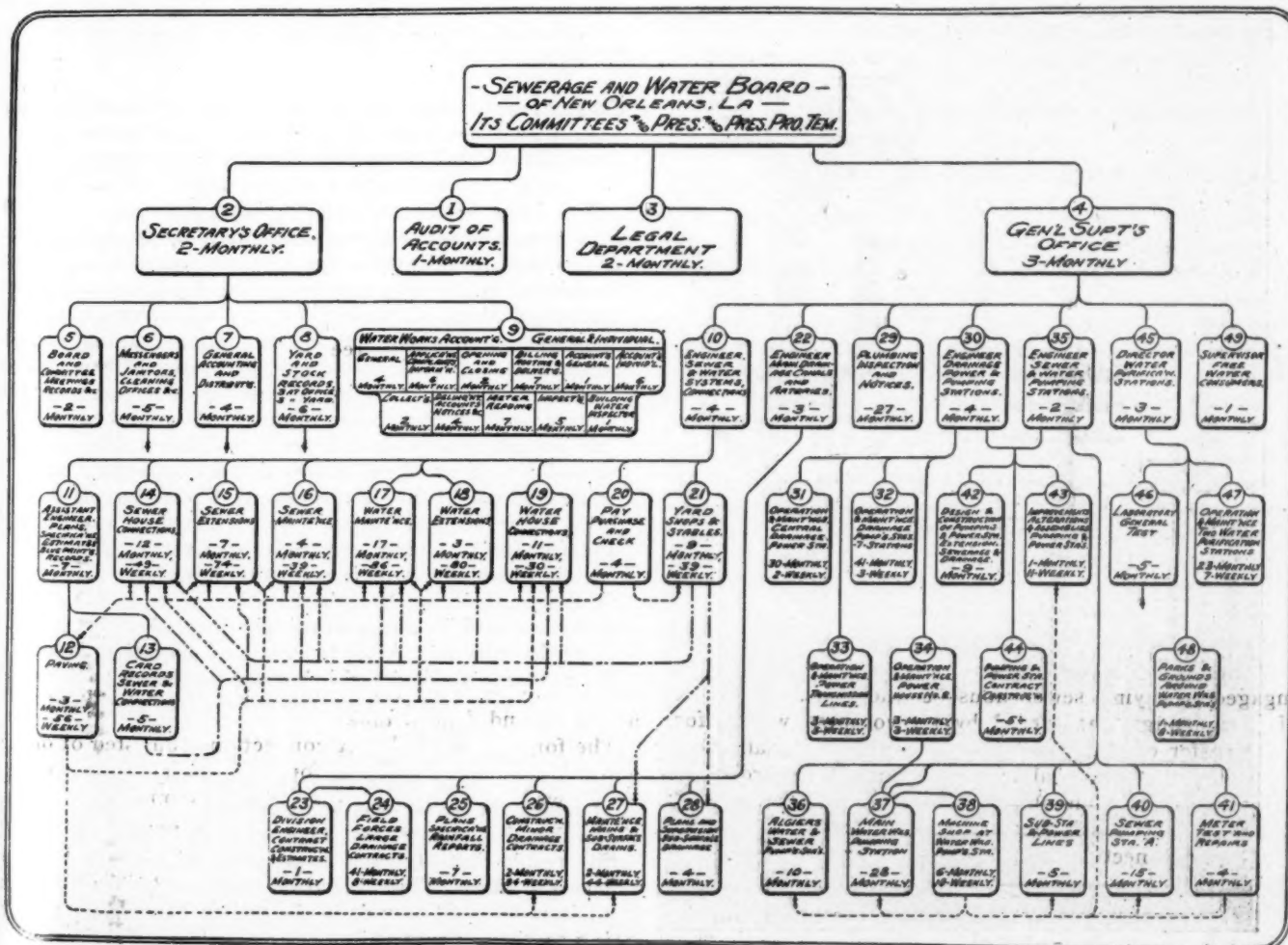
inches upward were installed by a gang under the direction of the water maintenance office. The force named installed 6,767 house connections during the year and connected 27 flush tanks to the distribution system. Of the total services, 6,476 were 5/8-inch, 108 were 3/4-inch, 104 were 1-inch and 15 were 1 1/2-inch.

The sub-department of water maintenance consisted of one general foreman, seven foremen in gangs of three to nine men each, four to six emergency turn-off men, two valve and hydrant inspectors, one steamship supply gang, a head clerk, a complaint clerk, three other clerks and a timekeeper. This sub-department maintained and kept in repair 564.3 miles of water mains from 4 to 48-inches in diameter, 5,227 valves, 5,508 hydrants and 47,653 water services from 5/8-inch to 10 inches in diameter. During the year this force made 566 repairs to mains, 561 to valves, 605 to hydrants, 1,055 to services and 1,834 to meters; it removed 2 valves, 53 services and 23 meters; it moved 335 sections of mains, 22 valves, 172 hydrants, 319 services and 140 meters; it inspected 3,304 valves, 3,659 hydrants and exchanged 2,024. It also flushed mains 1,579 times, readjusted 347 valve boxes, painted 3,625 hydrants, located 1,032 meters, repaired 940 meter connections, set 586 meter boxes, supplied 1,012 steamships and performed a considerable number of other miscellaneous services.

This force also attended to damage done by electrolysis, having to remove during the year on account of such damage 1,692 feet of mains and 1,395 feet of services. Previous to 1914 it had been necessary on account of electrolysis to remove 11,793 feet of mains, 12 valves and 1,836 feet of services.

The board also maintains a force for relaying pavement disturbed in the construction and maintenance of the sewer and water systems. During the year 1914 the force varied from a maximum of two general foremen, one foreman, four material men, eighteen pavers and eighteen laborers, two follow-up men, twenty-two laborers, four two-horse wagons and four carts, to a minimum of two general foremen, two material men, eleven pavers and eleven helpers, two follow-up men, seven laborers and two two-horse wagons. These forces kept in repair all cuts made by construction and maintenance forces as well as restoring all pavements disturbed by them except asphalt and similar pavements. The work done during the year totaled 590 square yards of brick pavement, 948 of granite block, 2,852 of square block, 3,528 of cobblestone, 8.8 of gravel, 8,452 of Schillinger, 34,642 of brick and 1,069 of flagging. This work was distributed over 102 jobs of sewer construction, 7,787 of sewer house connections, 456 of sewer maintenance, 15 of water construction, 4,149 of water house connections, 1,272 of water maintenance and 96 of drainage house connection. In addition to this, some work was done by various paving concerns having maintenance obligations or handling such kinds of pavement as the board's forces were not equipped to lay, about 70 per cent of which was asphalt, with the remainder about evenly divided between bitulithic and granitoid.

The plumbing department, in charge of a supervisor of plumbing, examines all plans for plumbing, issues permits for same and inspects the work. Four inspections are generally required for every job before it is declared satisfactory in its entirety. These tests con-



ORGANIZATION OF NEW ORLEANS SEWERAGE AND WATER BOARD
Showing 442 Monthly and 638 Weekly Employees.

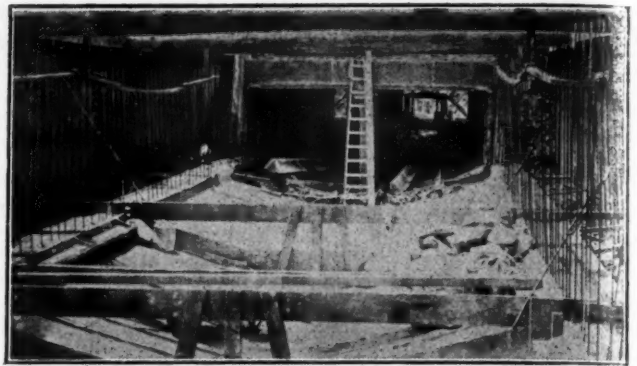
sist of a ball test, a house connection or tie-in test, and a water and peppermint test.

The ball test is an inspection and test of the underground pipe which runs from the property-line back, receiving the discharge from the plumbing fixtures in the building and conveying same to the public sewer in the street.

The inspector sees that the pipe is laid at a grade of not less than one-quarter of an inch to the foot, and that the joints are properly made, caulked and cemented, and that the proper covering is maintained in accordance with the plumbing rules. The line is then tested by sending through it, from end to end, a wooden ball, one-half inch less in diameter than the diameter of the pipe.

The house connection inspection is made where the public and house sewers are joined together at or near the property line. This inspection consists of seeing that the proper fittings are used, cleanouts brought up so as to enable the proper cleaning out of the line in the event of stoppage, and the proper concreting of the whole.

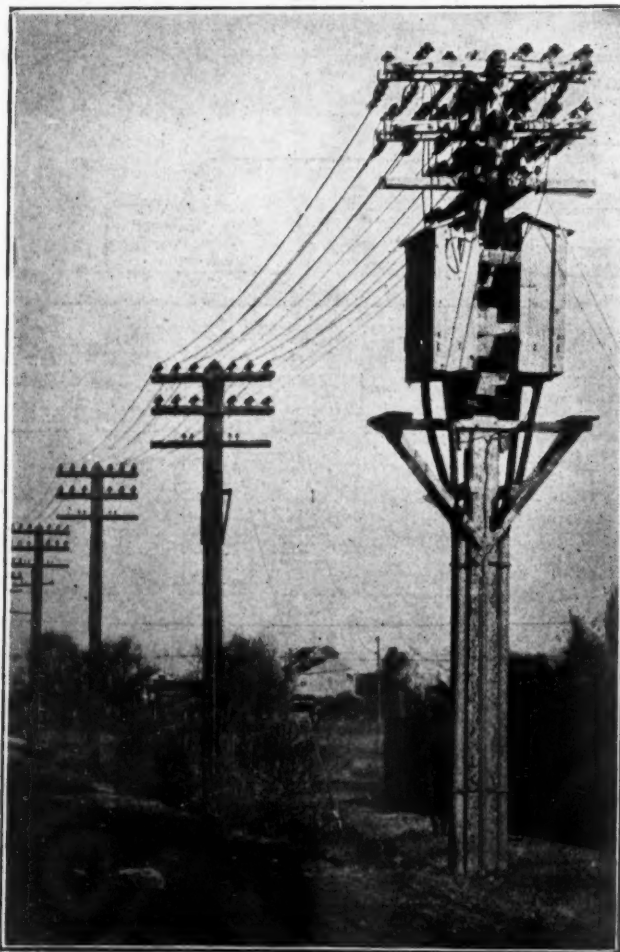
The water test is made after the plumbing work inside of the building has been "roughed-in." The stacks are filled with water and allowed to remain in that condition for some hours. The inspector then examines the joints closely, and if they are improperly caulked, leaks will appear at these points. At the time of this inspection it is the duty of the inspector to examine the kind of pipe used, i. e., whether standard or extra heavy (for in some instances only the latter can be used), the depth of hubs, the size of pipe, the proper use of vents, and, in



REINFORCED CONCRETE CONDUIT, NEW ORLEANS.

fact, to see that in every particular the work conforms to the rules of the board and is sanitary in every respect. This is the severest test put on the work, for, having passed this test, the only thing necessary to be done is the setting of the fixtures.

The fixtures having been set, the work is then subjected to what is known as the peppermint test. This test consists of pouring into the cleanout a mixture of hot water and oil of peppermint. The fumes that arise from this mixture are so pungent that if the work is not absolutely tight the odor of peppermint will be immediately detected in the premises. The inspector then tries out all the fixtures for the purpose of ascertaining whether or not they are in good working order. At the time of this inspection all vaults and cesspools must be excavated, cleaned and filled, and the work as a whole must be in a completed condition.



LINE TRANSMITTING CURRENT FROM POWER STATION TO PUMPING STATION.

ELECTRIC PUMPING AT FAIRMOUNT

Comparison of Service by Reciprocating Steam Pumps and by Electrically Driven Centrifugal Pumps for Town of Twenty-five Hundred Population.

By JOHN A. RANDOLPH.*

The town of Fairmount, Indiana, last year changed from steam-driven reciprocating pumping to electrically-driven centrifugal pumps for its waterworks system. At the time the change was made the distribution system comprised about six miles of water mains supplying 566 consumers and 41 fire hydrants. The pumping station equipment consisted of two 12½ by 8½ by 10 Dean Bros. duplex pumps, each having a capacity of 400 gallons per minute; two 50 h.p. boilers, one feed water heater, two feed pumps, and six wells from 40 to 300 feet deep. There was also a reservoir of 26,000 gallons capacity that was connected with the fire mains. When the plant was built, nineteen years ago, it was planned to use natural gas for fuel, as there was an abundant supply of this fuel in the town, and it was, therefore, not considered necessary to locate the plant with a view to fuel transportation and it was accordingly located eight squares from the railroad. After ten years of operation, however, the gas supply failed and it became necessary to use coal, and this was carted from the railroad to the plant at a cost of 27 cents a ton.

The pumps were on the ground level and the suction lift ranged from 20 to 26 feet, depending upon the rate at which the water was being pumped. At times during the day the demand for water exceeded the supply, with the result that at least 15 per cent of air was pumped into the lines. This objection, together with a variation of from 10 to 20 pounds in the pressure, was very annoying to the consumers.

*Of the Society for Electrical Development.

A fourteen-day test made during the operation by steam gave the following results:

Amount of coal burned in 14-day test.....	30,940 lbs.
Average amount per day	2,210 lbs.
Amount of water pumped in the 14-day test.....	2,892,675 gals.
Average per day.....	206,619 gals.
Average per minute	143 gals.

Coal cost, at mines	\$1.05
Freight, per ton	1.55
Cartage .....	.27

Total cost \$2.87

The items of the operating expenses for this test were obtained from the yearly totals as follows:

ANNUAL OPERATING EXPENSES. STEAM PLANT.

Engineer's salary	\$1,140.00
Repairs	20.00
Oil and waste	50.00
Boiler compound	26.00
Boiler insurance	25.00
Depreciation* at 10%	280.00
Interest* at 6%	168.00

Total for one year \$1,709.00

Average for 14-day test	\$65.55
Coal for test, 30,940 lbs. @ \$2.87 per ton...	44.2989

Total expense for 14-day test \$109.85

*The interest and investment were figured on the apparatus installed in the plant, which included boilers, feed water pumps and heater, fittings and pumps, and not on the building, or \$2,800.

The total expense for the fourteen-day test was \$109.85. As the total pumpage was 2,892,675 gallons, the cost per thousand gallons for pumping was 3.80 cents.

When the change to electric pumps was made the equipment installed was as follows:

One 200-gallon centrifugal pump, driven by a 10-h.p. motor, supplying domestic service at 40 lbs. pressure.

One 500-gallon centrifugal pump driven by a 35-h.p. motor, supplying fire service at 90 lbs. pressure.

The pumps were placed in a pit 14 feet wide by 20 feet long. The pit was made 10 feet deep in order to decrease the suction lift and to thereby secure more water.

After these changes had been made the service was materially improved. There was absolutely no air in the mains. A steady pressure of 40 lbs. was maintained. Furthermore, the capacity of the system was increased by 50 per cent.

The pumping apparatus is under excellent control at all times. The pumps are equipped with electrical alarms, arranged to sound in case of trouble or failing pressure.

The switchboard is within easy reach of the attendant's residence and the pump room. Should a fire occur at night after the operator has retired, the time required to get the fire pump fully under way is only a minute and a half.

The town fire alarm whistle is located at the station and was formerly operated by steam. It is now sounded

by compressed air supplied by a 4½ by 4½ compressor delivering 25 cu. ft. of air per minute and driven by a 7½-h.p. motor. The storage tank measures 4 by 10 feet and the pressure carried is 200 lbs. A reducing valve is placed between the tank and the whistle. This outfit makes a much better alarm than the old system. Its cost was \$510. One hour's operation out of every 24 is all that is necessary for the compressor to maintain the pressure on the tank at 200 lbs. In addition to its use as a fire alarm, the whistle is blown for 12 seconds at 5 and 7 A. M., 12 noon, 1, 6 and 8 P. M.

The amount expended in making all of the above changes on the plant was:

Pumps	\$1,250.00
Small primer pump	125.00
Pipe and fittings	310.00
Compressor and tank	510.00
Foundations and pit	275.00
Labor	325.00
Cottage (7 rooms)	\$2,367.80
Walks and incidental expense	125.00
Lowering wells and suction line:	
Pipe and fittings	\$375.00
Concrete manhole over wells (6)	150.00
Miscellaneous material	200.00
Labor	1,554.27
	<u>2,279.27</u>

Grand total \$7,567.07

NOTE: The labor charge for the lowering of the wells and suction lines covers the charge for removing the old suction. It also covers other expenses for levelling up the grounds around the plant.

The plant has now been in operation for several months. During this time not a cent has been spent for repairs.

The data covering the operating expenses and the performance since the new equipment has been in operation are as follows:

For the Year ending February 1, 1915.

Amount of water pumped	75,996,230 gals.
Average amount per day	208,209 gals.
Average per minute	145 gals.
Amount of current used	55,566 kw.h.
Average per thousand gals.	731 w.h.
Operating Expense:	
Salary of attendant (\$60 per month)	\$720.00
Oil waste and packing	1.75
Incidentals (fuses electric) .....	.75
Total	<u>\$722.50</u>

[Note by Editor: The above amount does not cover charges of interest on the investment and depreciation, which would be almost exactly the same as with the steam plant, nor cost of current. The cost of current is not given, but if we assume it to be 2 cts. per kw.h. we have the total cost, 3.00 cts. per thousand gallons, as compared with the 3.80 cts. for steam pumping on the same basis; most of the saving being in the engineer's salary.]

The space occupied by the electrical pumps is so small

Data on the Fairmount Waterworks for the Year Ending Feb. 1, 1915, Based on the Population of 2,506, Census of 1910.

Month	Gals. per mo.	Av. per day	Av. per min.	KWH.	Watts per 1000 gal.	Gals. per capita
February, 1914	5,319,975	190,000	131	3,883	730	76
March, 1914	6,045,000	195,000	135	4,383	725	77
April, 1914	5,560,800	191,750	133	4,090	735	76
May, 1914	6,166,200	198,909	138	4,350	706	79
June, 1914	6,684,450	229,815	159	5,010	739	88
July, 1914	7,221,475	239,402	166	4,040	691	95
August, 1914	6,687,075	215,712	149	5,050	755	86
September, 1914	6,418,725	213,957	148	4,810	749	85
October, 1914	5,872,875	189,447	131	4,760	812	75
November, 1914	5,975,000	199,166	138	4,780	800	79
December, 1914	6,430,370	207,431	144	5,080	790	82
January, 1915	7,614,285	245,622	170	5,330	700	98
Total	75,996,230	Av. 208,209	Av. 145	Total 55,566	Av. 744	Av. 83

as compared with the steam plant that a large portion of the building formerly occupied by boilers, bunkers and steam apparatus is now used as a dwelling for the attendant. The duties at the station are so light that the same man who operates the station looks after the distribution system as well; a member of his family giving what little attention is necessary to the pumps in his absence.

The writer is indebted for information and valuable assistance in the preparation of this article to Earl Morris, superintendent of the Fairmount waterworks and to the A. G. & E. Bulletin of New York.

ERIE WATERWORKS IMPROVEMENTS

Rapid Filters of Twenty-four Million Gallons Capacity, New High Lift and Low Lift Pumps and Boilers —Operation of Plant.

For three or four years past the Erie, Pa., commissioners of water works have been engaged most energetically in improving the municipal water supply of that city, and have at last reached the point where they can rest on their laurels for a short time while regulating the new units to work in harmony with the old and adjusting them to the present and increasing requirements of the consumers.

The city has a population of about 82,000. The works were originally constructed in 1867, the supply being taken from Lake Erie. A reservoir was built in 1873 about two miles from the pumping station with its bottom 210 feet above the water in the lake. A standpipe about 260 feet high was built in 1868, but its use was discontinued some years ago and it was taken down in 1913; a new standpipe having been completed a year previous which is 80 feet high and 25 feet in diameter. A few years ago the desire for purifying the lake water before serving it to the consumers was met temporarily by the construction of a sedimentation basin, but it was realized that this was by no means fully satisfactory, and a filter plant was constructed and was put into operation about a year ago.

The pumping station, on the shore of the lake, at present contains four units: a Gaskell horizontal compound, erected in 1886, having a capacity of five million gallons per day; a Worthington horizontal compound high-duty, twelve million gallons per day, built in 1893, and another of the same type with a capacity of eight million gallons, built in 1899. The fourth pump, which was put in service in 1914, is a twenty-million-gallon, triple expansion, crank and flywheel condensing engine with cylinders 33 inches, 66 inches and 98 inches and a 5½-foot stroke, constructed by the Bethlehem Steel Company. There are also two low-service pumps for raising water to the filters, each twenty-million-gallon capacity centrifugal, driven by Shepard engines. The boiler house contains four horizontal tubular boilers, in batteries of two each, which are 72 inches in diameter and 18 feet long. Four other boilers, put in service in 1913, are 350-h.p. water-tube boilers fitted with Erie automatic stokers, capable of carrying 225 pounds steam pressure to the square inch.

The pumping plant uses bituminous coal, slack and nut, giving an average of 10.08 per cent of ash and costing \$1.80 per net ton. The amount of this coal consumed during 1914 was 13,566 tons. The total pumpage was 6,314 million gallons, giving a pumpage of 232.7 gallons per pound of coal.

The new twenty-million-gallon pump has been doing most of the pumping since it was placed in regular ser-

vice last year. Water is taken from the lake through two intakes. One, constructed in 1868, is 975 feet long; the second, completed in 1896 and extended in 1904, is now 17,641 feet long, of 60-inch cast iron and steel pipe throughout, and is believed to be the longest single piece of submerged pipe of this kind in the world.

Of the 6,314 million gallons consumed last year, 1,904,000,000 passed through meters, or about 30 per cent. The daily consumption per inhabitant was 174½ gallons. The cost of supplying this per million gallons, figured on pumping station expenses only, was \$8.168.

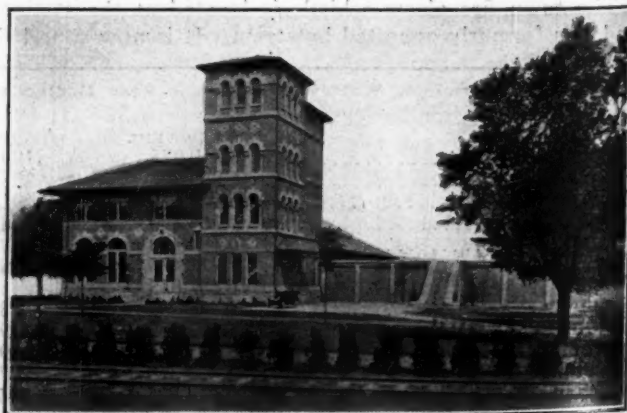
The water mains have a total length of 151 miles. Last year about a mile and a quarter of 4-inch and 6-inch mains were replaced with larger sizes, but the city still has in service nearly three miles of mains less than 4 inches in diameter and about 25 miles of 4-inch pipe. Over half of the mains now in service consist of 6-inch pipe, and about one-third of the remainder of 12-inch.

On the distribution system there are 931 fire hydrants. In addition to these, there are 27 hydrants to be used by sprinkler carts. All of the sprinkler cart hydrants are 1½-inch and all but two are placed on either the east or north side of the street, as are the mains. The city is to be congratulated on this generous supply of sprinkler cart hydrants, since much of the damage done to fire hydrants in other cities is due to the use of them by careless or ignorant drivers of sprinkling carts.

The department furnishes considerable water for public use, included in which is 43 drinking fountains for men, horses and dogs. Of these fountains, one, installed eleven years ago, has three outlets for men and one for horses. The next style, which was used until 1906, has a square base with oval sides and a plain top, with one place for men, one for horses and two for dogs. A style in use since 1902 consists of a 20-inch cast iron water pipe, 7 feet long, set vertical and standing 4½ feet above the ground, which runs all winter and does not freeze. Since 1909 the city has put in 21 Hygeia drinking fountains, the three put in last year having the automatic shutoff.

The most important improvement which the city has made is the filter plant, which was put into operation June 29 of last year. This consists of 12 units, each with a capacity for filtering two million gallons per day, which was constructed by the Henry Shank Company and the Norwood Engineering Company of Lawrence, Mass.; Chester & Fleming having been the engineers for the city in designing and constructing the plant. The cost of the plant was \$162,659.

Before the filter plant went into operation the water was treated with hypochlorite. During the first half of 1914 this was used at an average rate of 7.06 pounds per million gallons. Although the filters produce an effluent



FILTER HOUSE AND COAGULATING BASIN, ERIE.

which is believed to be perfectly safe, the authorities decided to continue the use of hypochlorite, finding that the addition of from 3 to 3½ pounds per million gallons would render the water practically sterile. (As a matter of fact, during the first six months of operation of the filters an average of 4.85 pounds per million gallons was added.)

The settling basin, which was used before the filters were built, was found to remove a little over 50 per cent of the turbidity, and the continuation of its use in connection with the filter plant is estimated to save an average of \$8 per day in the amount of aluminum sulphate and wash water which would otherwise be required if raw water were sent directly to the coagulating basins.

During the first six months of operation of the filter plant, the amount of aluminum sulphate used averaged 0.368 of a grain per gallon, the amounts applied varying from 0.15 to 0.6. These variations were more for experimental purposes than because of theoretical necessity. It is realized, however, that for efficiency and economy the amount must be varied with the physical changes in the raw water. No lime is used, the natural alkalinity of the lake water being greatly in excess of the amount required to produce the necessary reaction with the aluminum sulphate.

There are two coagulating basins operated in connection with the filtration plant. One of these was cleaned after a little less than four months' operation and sludge to a depth of 2 feet was removed, in which was a considerable quantity of shells. The other was cleaned after a run of nearly five months, a considerably greater amount of sediment being removed than in the case of the other.

Wash water used during the first few months of op-

eration averaged 3.22 per cent of the net amount filtered. While this is not an exceptionally high percentage, the superintendent reports that it is probable that this rate will be reduced, because he feels that the plant can be operated with as high a standard of efficiency with the use of a smaller amount. When operation was first commenced, a considerable amount of wash water was used for removing from the beds a large amount of air which was in them (as is usually the case with new beds); also, considerable experimenting was necessary to regulate the amount of aluminum sulphate required for the most efficient results, and these were both factors in requiring the use of an excessive amount of wash water.

The application of chemicals to the water is controlled automatically, and these automatic controls are said by superintendent J. S. Dunwoody to have operated perfectly after once having been properly adjusted. Daily averages computed at the end of each week of operation showed a regulation of the aluminum sulphate solution orifice which gave a variation of only 0.006 of a grain per gallon of water, and equally accurate control for the hypochlorite solution orifice.

The plant is operated by five men. One filter operator is employed on each of three 8-hour shifts and has charge of the general operation. A laboratory assistant, who also acts as a general assistant throughout the plant, and a janitor complete the working force. The superintendent acts as a chemist and bacteriologist and is in charge of the entire plant.

The cost of operation during the last six months of 1914 was \$2,623 for salaries and \$2,675 for all other expenses, these not including the low-duty pumping, lighting of station, etc. This gives a cost per million gallons filtered of \$1.72.

From results obtained by daily analyses since the plant was put into operation, it has been shown to have removed 100 per cent of the turbidity and undissolved organic matter and 98.73 per cent of the total bacteria present in the raw lake water. The average number of bacteria per c.c. varied from a monthly average of 304 in August to 1,662 in December, while that in the filtered effluent varied from 2 in September to 15 in December, the average for the six months being 9. Pathogenic germs were found in about 30 per cent of the samples of raw water examined, but were found in none of the 306 samples of filtered water. The turbidity of the raw water varied from a monthly average of 3 in July to 47.6 in November, the average being 18.02; while, as stated, the turbidity after filtration was always zero.

Color has not proved at all troublesome in Lake Erie water. It varies from 8 to 20 parts per million before filtration and from nothing to 2 parts per million after.

PAYING WATER BILLS.

The number of open accounts of the waterworks department of New Orleans in the latter part of 1914 was over 47,000. The city was divided into only six billing sections and approximately 16,000 accounts became due on the first and sixteenth of each month, resulting in a great congestion in the office of the collection department on those dates. In order to relieve this, the city was redistricted into sixty billing sections, twenty sections falling due each month, or one section every working day except Saturday, this plan going into effect on January 1, 1915. It was believed that this would result in a more even distribution of the work of all the men in the department for the entire month, would relieve the congestion at the receiving and complaint windows, thus greatly assisting the public in paying their water bills, and would also considerably reduce the expense of the department.



ONE SIDE OF FILTER GALLERY, ERIE PLANT.

ST. LOUIS WATER WORKS IMPROVEMENTS

Work Carried to Completion During the Past Four Years—Improvements and Extensions to Intake, Pumping Plant, and Distribution System

With the completion and installation in service of its new rapid filters, the largest in the world, St. Louis, Mo., has brought to a culmination a work of improvement which has extended over about four years. The water commissioner of the city, Edward E. Wall, in his report for the year ending April 1, gives a summary of the work done by the Water Division of the Department of Public Utilities since he took office four years previous. "For more than ten years prior to the appointment of the present water commissioner in 1911," says he "nothing had been done to increase the quantity of water which the water works could deliver to consumers. During this time the average daily consumption of water had increased from 63½ million gallons to 81 million, so that the capacity of the works was greatly over-taxed in times of emergency.

"In many localities in the city, pressures were low, in some instances dropping to zero during hours of greatest consumption. The difficulty of obtaining a sufficient supply through the intake at periods of low water and cold weather, which usually come together, became greater and greater each year. The capacity of the purification plant was considerably below the normal demand in time of high turbidity in the river." (For eleven years previous to the completion of the new filters, the water had been clarified and partially purified by sedimentation, assisted by lime and sulphate of iron.)

In 1911 an opening was cut in the intake tower lower than the others then in service; the operation of the settling basins was modified so as to increase their purification capacity; two 40-million gallon centrifugal pumps were installed in place of the two 20-million gallon reciprocating pumps; the boilers were overhauled and new tubes placed where necessary; a 42-inch Venturi meter was placed on the discharge lines from each pump so that its actual output could be recorded; a 12-inch pump was placed at the bottom of the pump shaft so that the tunnel could be emptied for inspection; an ice fender was built on the upper side of the intake tower, and 9,000 feet of revetment was constructed along the river bank to protect the conduits and water works railway. The above improvements were all made at the Chain of Rocks station.

At Bissell's Point, boilers which had been in service so long that the inspector of boilers refused to sanction their use at the working steam pressure were replaced with new ones, and two 20-million gallon triple expansion pumps were installed in place of one old and inefficient single-acting pump of the walking-beam crank and fly wheel type. More than 24,000 feet of 36-inch pump mains were laid from this station to provide for the increased discharge from the new pumps, and about 15 miles of 12-inch to 30-inch mains were laid to serve as feeders of the distribution system in order to increase the supply and pressure for fire protection. One of the immediate results of these changes was an increase in pressure all over the city, in some cases as much as 30 pounds.

Having done what seemed to be possible to meet the immediate requirements of the plant, a systematic study was made in 1912 of the future needs and the extensions and additions necessary to meet them. By the latter part of the year general plans had been completed providing for a daily capacity of 150 million gallons, which was estimated to be the probable consumption in 1935, with an ultimate consumption in 1960 of 240 million gallons per

day. In March, 1913, an ordinance was passed appropriating \$1,200,000 for beginning this construction, and from time to time since then other sums have been appropriated until a total of \$2,648,000 had been set aside for additions and improvements.

The new additions provided for by these appropriations, nearly all of which have been completed, consisted of a new intake tower, tunnel and screen chamber; the reconstruction of the boiler plant and installation of chain grate stokers with coal and ash handling machinery at Chain of Rocks; revetment of two miles of river bank to stop the shifting of the river channel away from the intakes; a mixing chamber 2,400 feet long, composed of four channels, with changes in settling basins to permit a more efficient and economical treatment of the river water preparatory to filtration; a new generator house and machinery to provide electric light and power for the entire Chain of Rocks station; new 160 million gallon filters and head house; waterproofing two of the sedimentation basins; railway station and waiting room for the water works railway (see Municipal Journal for November 27th, 1913); general store house at Bissell's Point; reconstruction of high service station No. 2, providing for the operation of all pumps at Bissell's Point from one boiler house, thereby reducing the expenses by \$20,000 a year; construction of a new reinforced concrete conduit connecting the Bissell's Point settling basins with the engine houses, reducing the head pumped against by at least 10 feet and eliminating the danger of pollution of the water supply by the infiltration of sewage or surface drainage, which was possible through the masonry of the old, cracked and leaky brick conduit which had been in service for the past forty years.

The completion of the work outlined suffices to provide for the maximum demands that are likely to occur for the next two or three years, but Commissioner Wall states that to develop the full capacity of the present works without entirely duplicating or greatly enlarging the present buildings, basins, conduits, etc., it will be necessary to reconstruct Compton Hill reservoir, build a clear water storage basin at Baden, provide additional outlets from the pumps into the reservoir and into the distribution system, install two 20-million gallon pumps at one of the high service stations. He also thinks it absolutely necessary to cover the clear water basin at the filter plant to prevent the growth of algae. These needed improvements he estimates to cost \$3,410,000. Even this, however, will furnish a service which may be taxed to its limit by 1926, and he reports that the construction of new works should have been sufficiently advanced by that time to be delivering water to the city to supplement the old supply. The construction of these new works could, he estimates, be postponed for ten years, however, if water was sold by meters instead of at flat rates.

In discussing the finances of the department, the report states that during the past eleven years the collections have been less than the expenditures by an average of \$98,228 each year, the deficit having been made up by drawing on the accumulated surplus from previous years. During these eleven years the average cost of water pumped into the distribution mains was \$80.01, while the revenue derived from the operation of the works averaged \$71.77. These figures are based on the total quantity of water pumped into the mains. From the best available data, between 20 per cent and 25 per cent of the total pumpage is furnished in the form of free water or is lost from the system, so that the average price per million gallons paid by consumers for water used by them was \$93.72. If the total cost of operating the plant had been paid by them in the form of water rates, the average price would have been \$103.37 per million gallons.

As a result of improvements in operation methods, in-

creased consumption, etc.; it is estimated that the average cost of supplying water during the next seven years will be \$90.78 per million gallons, this being on the assumption that the average annual quantity of water paid for will increase to 25,576 million gallons by the end of that period, or 131 gallons per capita.

It is interesting to note the data upon which were based the figures for consumption required during the next few years. Figures for each year from 1900 to 1914 were plotted and the general curve continued to the year 1960. These showed a presumptive increase in population from 740,000 at present to 1,345,000 in 1960. Not only the population, but also the per capita consumption was assumed to continue increasing at the present rate, from 123 gallons per capita at present to 178½ gallons in 1960, with a maximum monthly rate 25 per cent greater than this.

During the last fiscal year, 34,656 million gallons were passed through the sedimentation basins and were treated with 13,660 tons of lime and 6,770 tons of sulphate of iron. A total of 358,000 tons of sediment was removed from the basins at a total cost of \$164,000, or 22½ cents per inhabitant. This amounts to about half a ton of sediment for each consumer in the city. Had the sediment been loaded into ordinary coal cars, they would have made a train 112 miles long.

During the year the department continued the work which had previously been begun of instructing the engineers and firemen in the economic operation of boilers and furnaces. A system of posting in the boiler houses the figures of coal consumed and water evaporated during each watch of eight hours, and of posting each week in each station the plant efficiencies of the various stations, has created a spirit of emulation among the men and has resulted in marked improvement in plant conditions. The engineers take hourly readings of the percentage of carbon dioxide in the flue gases, which gives them absolute information as to the combustion conditions in the furnaces and thus enables them to regulate the firing in closer accordance with the steam consumption. The amount of coal consumed at the high service stations shows a decrease in the quantity of coal used per million gallons of water pumped of 406 pounds below the figures of the previous year, a reduction of 14.2 per cent. This is a practical demonstration of the value of the work done by the mechanical engineers of the division during the year.

As previously described in Municipal Journal, St. Louis formally opened, on May 15 of this year, a filter plant which is the largest of its type in the world, which will supplement the work of the sedimentation basins which had been in use for eleven years previous. This plant, which cost about \$1,300,000, was constructed in the exceptionally short period of twenty months.

Among the minor changes made during the past few years, has been the adoption of a modern type of fire hydrant in place of the expensive and antiquated types which had long been used by the water works. About 3,100 new self-draining fire hydrants have been installed, half of them in the congested value district where formerly most of the troubles due to frozen hydrants occurred in winter. Not one of the new hydrants has been found frozen, although some have been in service three winters. In addition to the much greater efficiency of the new hydrants, there has been an actual saving in their cost of at least 25 per cent. An improved design of valve also has been adopted, and this has resulted in a saving in cost of about 50 per cent.

WATER DEPARTMENT RECORDS AT WALTHAM

Special efforts are made at Waltham, Mass., to keep the records of the water department complete and up to date. Large wall maps show the general location of mains, gates and hydrants, and detail tracings of these

are on file. Locations of gates and lists of hydrants with description and static pressure at each are published in book form, and construction plans and consumption records are kept on file. The water inspector recently completed a card system showing a complete list of all fixtures in the city, by means of which the matter of caring for leaky fixtures has been simplified. He is now working on a duplicate card system of all diagrams showing house services.

BRICK AND CONCRETE COUNTRY ROADS

Characteristics, Advantages and Disadvantages, Approximate Cost and Standard Methods of Constructing and Maintaining—Discussion by Office of Public Roads.

The United States Department of Agriculture is issuing bulletins on the various kinds of paving adapted to country roads, one on brick having appeared in July and another on concrete in August.

The former discussed briefly the raw materials used and the process of manufacture; the physical characteristics of brick and the standard methods of testing. Then at more length is described the method of constructing brick roads, including preparation of the roadbed, the curb, base and sand cushion, and laying bricks, rolling, and filling joints. Cement grout filler is recommended rather than bituminous filler, although advantages of the latter are recognized.

Expansion cushions along curbs are recommended, but not at transverse joints. It is stated the following is fairly representative of the best practice as to thickness: Width of roadway, 20 feet or less, thickness, ½ inch; width, 20 to 30 feet, thickness ¾ inch; width 30 to 40 feet, thickness 1 inch; width over 40 feet, thickness 1¼ inches.

After calling attention to the fact that cost of a brick pavement is affected by freight rates on brick, cost and efficiency of labor, amount and nature of grading necessary, and cost of other materials entering into the base, filler, etc., it gives the following as average costs:

Shaping and rolling subgrade, 3 to 5 cts. per sq. yd.

Curbs—Stone, 25 to 75 cts. per lineal foot; concrete, 20 to 50 cts.

Foundation—Gravel or broken stone, delivered, 60 cts. to \$2 per cu. yd.; spreading and rolling, 5 to 7 cts. per sq. yd. Concrete, materials delivered, \$2.50 to \$4.50 per cu. yd.; mixing and placing, 35 to 75 cts. per cu. yd.

Paving brick at the kiln, \$13 to \$16 per thousand. About 40 brick lay a square yard, giving the cost of brick at the kiln 55 to 65 cts. per sq. yd. Freight charges may more than double this cost.

"A force consisting of one paver and five laborers should place on an average about 220 square yards of brick per 10-hour day; while supervision, rolling, and incidental expenses are ordinarily equivalent to the cost of hiring about three and one-half additional laborers.

"If C = cost of cement per barrel, S = cost of sand per cubic yard, A = cost of coarse aggregate per cubic yard, B = cost of paving bricks per 1,000, and L = cost of labor per hour, with all materials considered delivered on the work and all costs expressed in cents, then the probable cost of constructing a brick pavement, including the subgrade, a 6-inch concrete foundation, and suitable curbs, may be estimated by substituting in the formula:

"Cost per square yard = $1.90 L + .213 C + .138 S + .157 A + .040 B$.

"The cost as estimated from this formula should usually be increased by about 10 per cent to allow for wear on tools and machinery and to guard against unforeseen contingencies. If it is desired to use a different thickness of foundation, it is safe to assume that each inch sub-

tracted or added to the thickness of the foundation will make a corresponding difference of from 8 to 12 cents in the cost per square yard.

"The principal advantages which brick roads possess may be stated briefly, as follows: (1) They are durable under practically all traffic conditions; (2) they afford easy traction and moderately good foothold for horses; and (3) they are easily maintained and kept clean.

"The principal disadvantage is the high first cost. The defects which frequently result from lack of uniformity in the quality of the brick or from poor construction are usually to be traced indirectly to an effort to reduce the first cost or to a popular feeling that local materials should be used, even when of inferior quality.

MAINTENANCE OF BRICK PAVEMENT.

"If brick pavements are properly constructed at the start, the work of maintaining them is very slight. Under the closest inspection, however, some inferior material is likely to become incorporated either in the foundation or in the surface, and it is therefore very important that a brick pavement be very carefully watched for the first few years of its life to see that no unevenness develops either because of defective brick having been used in the surface or because of insufficient support from the foundation at any point. Whenever any unevenness develops, it should be immediately rectified. Otherwise the pavement will become irregularly worn in the vicinity of the defects, and expensive repairs will eventually be necessary.

"Not infrequently weak spots develop in broken stone or gravel foundations, owing to surface water finding its way through joints in the pavement which have not been properly filled with grout. Careful observation of the joints should therefore constitute a part of the early maintenance work, and any defective joints discovered should be immediately remedied. Where the foundation is constructed of concrete, however, slight defects in the joints seldom result in any very serious damage.

"If care is exercised to correct all defects which appear within the first few years of the life of a well-constructed brick pavement, the work of maintaining the pavement proper should therefore, except for cleaning, be almost negligible for a considerable period. The shoulders and drainage structures, of course, need occasional attention, just as in the case of any other pavement, but if they are properly constructed at the start, repairs will usually be very slight.

"The life of a well-constructed brick pavement can not be estimated with any great degree of exactness, first, because the traffic conditions are constantly changing, and, second, because no brick pavement which has been constructed in accordance with the best modern practice has yet worn out. Such measurements as have been made of the amounts of wear sustained by given pavements during comparatively long periods of years have not been sufficient to warrant any very definite conclusions as to the probable terms of service, though they indicate that good paving brick wear very slowly under ordinary traffic. It is evident that in order to secure the full benefit of this excellent resistance to wear, the surface of the pavement must not be permitted to become uneven because of the failure of a brick here and there."

CONCRETE ROADS.

This bulletin gives the estimated amount of concrete pavement in the United States in 1914 as 19,200,000 square yards; in 1909 it was only 364,000 square yards.

The principal advantages of concrete pavements which have led to this increase in popularity are said to be:

- (1) Durability under ordinary traffic conditions.
- (2) A smooth, even surface offering little resistance.
- (3) Absence of dust and ease with which it may be cleaned.

(4) Comparatively small cost of maintenance until renewals are necessary.

(5) Availability as a base for another type of surface if desirable.

(6) Attractive appearance.

In commenting upon these advantages, the bulletin states that the durability of concrete roads has not yet been proved by actual practice, because there are no very old pavements as yet in existence; but from the condition of those which have undergone several years' service, it seems probable that they will be found to wear well.

The disadvantages of concrete as a road surface are:

(1) Its noise under horse traffic.

(2) The wearing of the necessary joints in the pavement; and the tendency to crack, with its consequent rapid deterioration.

(3) The difficulty of repairs when these become necessary.

In the past, efforts have frequently been made to overcome these objections to a certain degree by covering the concrete pavement with a bituminous wearing surface. At the present time, the specialists in the Department of Agriculture hold that this can not be economically justified, although it is possible that future investigation may change the situation in this respect. In the present state of road science, however, it seems that where traffic conditions are such that a bituminous surface on a concrete road is practicable, a bituminous surface macadam road would be equally practicable and certainly cheaper. Where traffic is too heavy for macadam road, the bituminous surface is likely to give way and the uneven manner in which it fails tends to produce excessive wear on portions of the concrete.

For a successful concrete road, hardness, toughness, and uniformity are the most essential qualities. These can be secured to a great extent by care in the selection of the constituent materials and the proportions in which they are mixed. The cement should always conform to some standard specifications for Portland cement, such as those issued by the United States Bureau of Standards or the American Society for Testing Materials. The sand should not contain more than 3 per cent of foreign material, and sand with more coarse than fine grains is to be preferred. The coarse aggregate may consist of either crushed stone or gravel; in either case it is very desirable that the coarse aggregate be well graded in size between proper limits.

The proportion of cement to the sand and coarse aggregate combined should not be less than about 1 to 5, and the proportion of sand to coarse aggregate not less than $1\frac{1}{2}$ to 3, nor greater than 2 to 3. A useful formula when gravel is used as coarse aggregate is 1 part of cement to $1\frac{1}{2}$ parts of sand to 3 parts of gravel. When crushed stone is used, $1\frac{3}{4}$ parts of sand may be substituted in place of $1\frac{1}{2}$ parts.

Ordinarily from one-third to one-half of the total cost of constructing a concrete pavement is for labor after the materials are delivered. This emphasizes the importance of efficient organization and proper equipment. Failure to take these factors into consideration frequently results, it is said, in adding from 10 to 20 per cent to the cost of a concrete pavement.

The most economical method is to have the work of mixing and placing the concrete as nearly continuous as practicable. The work should be planned with a primary view of keeping the mixer going full time. The drainage structures, the grading, and the sub-grade should, therefore, be completed well in advance of the mixer and provision made for obtaining all of the necessary materials without delay. A common error is the failure to make adequate provision for delivering water on the work, and the amount which a given stream is capable of supplying is frequently overestimated.

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SEPTEMBER 2, 1915.

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State Highways, East and West.

The state of New York contains about twenty thousand miles of improved roads, more than five thousand of which are state highways. Oregon has five thousand miles of improved roads, and Washington less than five hundred miles of state roads. These figures seem to place New York way in the lead of the western states in the matter of highways. But mere length is by no means everything. Texas, for instance, has an area covered by its roads equal to one-tenth of the entire land area embraced within the state of Rhode Island.

A fair comparison should consider the needs of the state and the resources, both natural and financial, upon which it can draw; also the time during which the state has been settled and road work has been going on. In all of these, the eastern states have the advantage.

We have taken, from the latest available records, the figures for miles of improved roads, population, area, and number of incorporated places in two eastern states—Massachusetts and New York—and two western states—Oregon and California; also the "assessed valuation of

all property subject to ad valorem taxation" as given by the Census Bureau. Comparing these, we obtain the following relative figures:

On the basis of miles of improved road per incorporated place, we find Massachusetts leads with 62; New York is second with 58, California third with 46 and Oregon fourth with 28.

In mileage per 1,000 square miles of area, Massachusetts again leads with 1,181 miles of roads; New York follows with 386 miles, California has 58 and Oregon 51.

But Oregon leads with 7.4 miles per thousand population when this is made the basis; California is next with 3.9 miles; Massachusetts is third with 2.8 miles, and New York last with 2.1 miles.

On the basis of assessable wealth, also, Oregon leads with 5.5 miles per \$1,000,000; California is second with 3.1 miles; Massachusetts has 1.97 miles, and New York 1.7 miles.

When we consider that Oregon has been settled a less time than any of the other states considered and California is the next youngest of the four, the fact that they lead the eastern states in mileage on a basis of both population and wealth receives added importance. Oregon has, after a few years' effort, improved five times as much road per dollar of its wealth as has New York after centuries of civilized occupation.

It is true that the character of roadway surfacing in the western states is less substantial than in the eastern, but as the population per mile is only one-third to one-fourth as great, it may be assumed that the traffic is proportionately less, and the requirements may be as well met by the construction used in the one state as in the other.

Credit is certainly due to the western states for the energy and success with which they are overcoming the handicaps of vast areas to be served and great distances to be covered, with a relatively small population and wealth to draw upon.

Cost of Wasting Water.

Figures are given, in two articles in this issue, concerning improvements to their water works plants which St. Louis and Erie have made during the past two or three years. Each has provided additional pumping facilities and also has installed rapid filters to supplement the sedimentation previously in use. The St. Louis filters have a capacity of 160 million gallons a day, the Erie plant of 24 million. The former gives a total capacity of 225 gallons per capita of present population; the latter gives 290 gallons per capita. Each is of course intended to provide for holding one or two beds out of service for cleaning, for maximum daily rates, and also for increase in population; although the ease with which additional units of filters can be added makes unnecessary a provision in present construction for a growth of very many years.

Erie had an average daily consumption last year of 174½ gallons per capita. St. Louis's figure was 123 gallons. These quantities would seem high even were the supply delivered by gravity and untreated. But in each case the source of supply is lower than any part of the city and must be pumped, and it is also purified at considerable expense; and the cost of each of these services varies to a considerable extent with the amount handled. It is true that each supply is practically unlimited in amount, but this does not affect the interest, sinking fund, maintenance and operating accounts of pumping and purification plants. If the consumption were reduced by fifty per cent, the cost of operation would be reduced by at least 25 per cent and the cost of the plant and the consequent interest and sinking fund payments by fully as much. In fact, it seems probable that each city could

have postponed for several years the purchase of any additional pumping machinery if it had limited its consumption to 100 gallons per capita.

Each city provided filter capacity 70 to 80 per cent greater than the present consumption. Each, we believe, by arranging to cut down its waste, could have reduced the cost of its filter plant by an amount equal to \$3 or \$4 per service connection. If we add to this the saving in cost of additional pumping machinery, and in the operation of both, we have a very considerable sum which could be applied to reducing the consumption, or rather eliminating waste.

It will cost St. Louis about \$91 per million gallons to furnish filtered water at the rate of 127 gallons per capita. It seems almost certain that 50 gallons of this is wasted, or say 350 gallons per day for each family. This amount for one year would cost \$11.62—the average amount each head of a family who pays water rates and taxes will have to pay yearly for this waste. Is it worth it? Is this not a sufficiently impressive sum to demand efforts to suppress waste of water?

It may be argued that if the consumption be reduced, the cost per million gallons will be increased, and therefore the reduction per capita be very much less than the above. But St. Louis is growing—any of her citizens will admit that. If the total consumption of the city be kept constant and the rate per capita be gradually reduced to compensate for the increase in consumers, the cost per gallon should remain the same, and thus the cost per capita decrease. Even considering immediate results, it seems probable that the reduction in annual cost should be say one-fourth that in consumption, or nearly \$3 per connection per year. If meters were used to reduce waste, \$1 should cover interest and depreciation on the cost of installing a meter, leaving \$2 to cover repairs, reading and other expenses connected therewith. But apparently no such idea is entertained in that city, for the plans for the future provide for an increasing rather than a decreasing rate of consumption, and a per capita rate of 178½ gallons is figured on for 1960.

Citizens of most cities protest most vigorously against the introduction of meters when the idea is new. Can it be they really appreciate that in St. Louis, for instance, it is estimated that the increasing tendency to waste water will result in 50 years in adding an average of \$20 to what each head of a family must pay annually for water?

EXPERIMENTAL POST ROADS.

Four hundred and sixty-five miles of experimental post roads of different types, benefiting 28 different counties, are now under construction in 13 States, which are co-operating with the federal government. These roads, which are being built under the supervision of the United States Department of Agriculture, are authorized by the Act of Congress of August 24, 1912, which appropriated for the Post Office Department \$500,000 to be expended in an experiment to test out the value of improved rural carrier routes. The federal government pays one-third and the state or county benefited must defray two-thirds of the cost. The entire sum of \$500,000 of federal funds and \$1,000,000 of local funds will be expended under the supervision and checking of federal highway engineers.

The following work on post road improvement has been undertaken, according to a bulletin dealing with the construction and maintenance of roads and bridges, shortly to be issued by the Department:

Lauderdale County, Ala., 30 miles of earth road; Boone and Story Counties, Iowa, 51 miles of earth road; Dubuque County, Iowa, 20 miles of gravel road; Bath and Montgomery Counties, Ky., 11 miles of macadam road; Montgomery County, Md., 5.4 miles of macadam road; Cumberland County, Me., 21 miles of bituminous macadam road; Leflore

County, Miss., 24 miles of gravel road; McDowell County, N. C., 16 miles of earth road; Davie, Forsyth and Iredell Counties, N. C., 48 miles of sand-clay and top-soil road; Licking and Muskingum Counties, Ohio, 24 miles of concrete road; Jackson County, Oreg., 51.4 miles of earth road; Aiken County, S. C., 27.3 miles of sand-clay and top-soil road; Loudon County, Tenn., 6.4 miles of macadam road; Montgomery County, Tenn., 7.6 miles of macadam road; Bexar, Comal, Travis, Hays and Guadalupe Counties, Texas, 71.6 miles of gravel road; Fairfax County, Va., 12.3 miles of gravel road; Spotsylvania, Caroline and Hanover Counties, Va., 38.2 miles of sand-clay and top soil road.

As rapidly as these roads are constructed, the department is endeavoring to interest the local authorities in inaugurating systematic maintenance to keep them in condition. The county engineer has undertaken the maintenance of the Virginia post road in Spotsylvania county, and another will supervise the upkeep of the completed part of the Ohio post road. It is believed that this local maintenance system will be extended to the post roads to be built in Maine, Tennessee, Texas and Alabama.

WATER PURIFICATION AT AUGUSTA.

Owing to the fact that during 1914 there were long periods when the water supply of Augusta, Ga., was muddy, more alum was used for coagulation than was necessary in 1913. In that year the average charge of alum per gallon was 0.553 grains, while in 1914 it was 0.675 grains. In August, when a bad stretch of weather was encountered, 1.4 grains per gallon was used. The minimum was in May, when 0.156 grains were used, the turbidity being 7.2 inches; in August it was 0.7 inch.

The daily average amount of water used in 1914 was an increase of 1.67 per cent over that used in 1913, when the average was 8,288,112 gallons. The total amount pumped in 1914 was 3,530,295,828 gallons, of which all but 130,216,106 gallons (which was pumped by steam) was furnished by water pumps.

Water waste has caused some trouble, and the most of the recent increase in pumpage is due to this. Systematic inspections reduced the leakage for short periods only but gave no permanent relief. Plans are now being made for metering the services.

HARRISBURG'S MUNICIPAL ASPHALT PLANT.

Harrisburg, Pa., has a population of about seventy thousand. Of its streets, 75 miles are paved, 95 per cent with sheet asphalt. The repair problem is therefore a most important one, and the city has recently purchased and put into operation an asphalt repair plant with a capacity of 1,000 square yards of top surface in a ten-hour day. Under the law, the municipality can do nothing but repair work, but there is enough of this to keep the plant busy, superintendent Wm. H. Lynch informs us.

The plant, which was furnished by the F. D. Cummer & Sons Company, has, as stated, a guaranteed capacity for turning out easily 1,000 square yards of 2-inch sheet asphalt topping, or the equivalent of asphaltic concrete or Topeka mix, per day of 10 hours. It is designed to lay any of these pavements equally well and without changing the plant in any way. This feature makes the plant especially adapted for a municipality, which naturally has to keep various kinds of asphalt pavements in repair.

The principal units of this plant are the Cummer dryer, sand storage bin and asphalt mixer. The dryer is 54 inches in diameter, with an easy capacity for turning out 10 tons of dried and heated sand and stone per hour. It is encased in a heavy steel casing lined with fire brick, and mounted on a structural steel frame with the hot sand elevator, sand storage bin, and mixer. The driving mechanism for these units also is connected to this steel

frame. This construction is very simple and rigid, as none of this driving mechanism is supported from the building, as is the case in most asphalt plants.

The sand storage bin has a holding capacity of 7 tons and is divided, and equipped with a revolving screen, so that the hot sand and stone are stored in separate compartments, and can be weighed separately into the mixer.

The asphalt mixer is of 9 cubic feet capacity, steam jacketed.

There are two steam melting asphalt kettles, each with a holding capacity of 5 tons, or a total of 10 tons for both kettles. These kettles are raised on structural steel supports, with the bottoms of the melting kettles about 3 feet above the mixer, so that the asphalt runs by gravity to the asphalt weighing bucket over the mixer. The steam coils in the asphalt kettles are 1½-inch electrically welded continuous coils, so that there is no danger of steam or water getting into the asphalt.

All asphalt pipes and cocks are steam-jacketed to prevent the asphalt getting cold.

The sand dryer is equipped with a large size dust collector, which makes the plant practically dustless.

The plant is run by a 60-h.p. boiler and a 40-h.p. engine. The boiler supplies the steam for melting the asphalt as well as operating the engine. The condensed hot water from the asphalt kettles automatically returns to the boiler.

This plant is housed in a structural steel frame building, covered with corrugated galvanized roofing and siding. That portion of the building containing the dryer and the boiler is one-story high, and the other part of

the building that contains the melting kettles, mixer, etc., is two stories high, with an extra platform around the top of the asphalt melting kettles. The asphalt is raised in barrels from the ground to the platform around the top of the asphalt melting kettles by means of a barrel elevator.

This complete plant, including the foundations, all the machinery and the building, was turned over to the city in less than 60 days from the date contract was awarded.

KENTUCKY ROCK ASPHALT ROAD

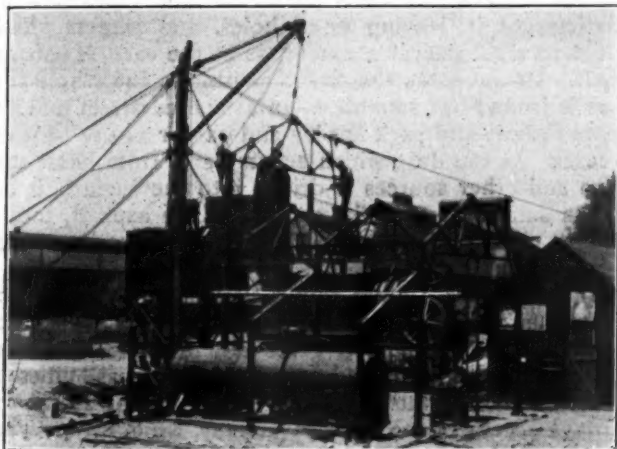
**Used for Resurfacing Six Miles of Road Near Louisville—
Previous Tests of the Material in Jefferson County—
Construction Method.**

By G. D. CRAIN, JR.

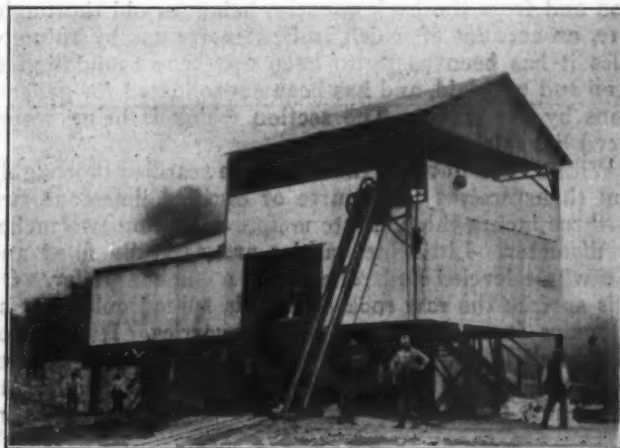
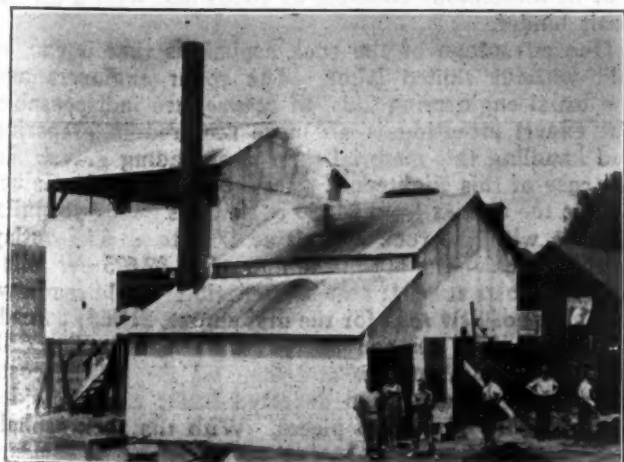
Jefferson County, Kentucky, is constructing a road surface just outside of the city of Louisville, on the Eighteenth street road, which is said to be the first instance of such an extensive use of Kentucky rock asphalt in Kentucky, although it has been used for road work in other states. The same county had previously made experimental use of the material, as had also the city, with such satisfactory results that this spring it was determined to resurface a stretch of six miles of the Eighteenth street road with the material.

The frequent rains this summer have greatly delayed the operations, but when the weather is favorable the resurfacing proceeds at the rate of three-quarters of a mile for each week of six working days, with a pay-roll of about \$50 a day. The total cost runs about \$4,500 a mile. The work is being done by the county itself, under the supervision of the county engineer, J. Russell Gaines, using the county's own equipment.

Kentucky asphalt is found in large quantities in Edmonson, Warren, Breckenridge and Logan counties, a tier of counties extending in a northerly and southerly direction almost across the state in a line roughly thirty-five miles west of Louisville. At least it has been worked in these counties and is believed to exist in various others in a practically inexhaustible supply. Geologically it appears in the Chester sandstones and in the lower sandstones of the coal measures, including the conglomerate sandstone. Quoting from the Kentucky Geological Survey: "The rock is very generally a sandstone which has been more or less saturated with petroleum, the latter (which completely coats each face of every individual grain of sand and thus forms a cementing material) being oxidized and the lighter oils driven off by exposure to the air. It is, in fact, an 'oil sand' which has been brought



ASPHALT PLANT UNDER CONSTRUCTION.



HARRISBURG MUNICIPAL ASPHALT PLANT. VIEWS FROM OPPOSITE SIDES.

to the surface and which, after exposure to the elements, forms a mass which can be separated only by crushing and grinding. The percentage of bituminous matter contained varies from 5 to 21 per cent; 7 per cent is the amount required for commercial uses as a practical road or surfacing material."

Beds of the material vary from 3 to 30 feet or more in thickness, sometimes pocketed. One plant (The Wadsworth Stone & Paving Co., of Pittsburgh, on Green river), takes the rock from the quarry to the jaw crushers, thence to a roller mill where it is reduced as nearly as possible to individual grains of sand, the surface of every grain being permanently coated with asphalt. This is the condition of the material as it is delivered to the road builders and the condition in which it is spread, cold, on the roads. The city of Louisville, about eight years ago, surfaced one square with the material, which is still in good condition. Five years ago the county put down 600 lineal feet at St. Helens, a small neighborhood shopping center on the Eighteenth street road. A church is there and much traffic comes from both directions, hitches and turns around on this 600 feet and a heavy automobile traffic goes over it at high speed; but this surface is still in good condition.

Last summer the Fiscal Court of Jefferson county put down three miles and a half of this material on the Taylor boulevard. It got heavy wear during the remainder of the year and passed through a winter extremely trying on roads, but when the county officials went out to inspect it in the spring they found it alive with boys on roller skates. A patch here and there required attention, but \$150 or \$200 put that strip in prime condition and it has remained in good condition through the first half of the year. The question then was whether the material could be obtained in sufficient quantity to justify more extensive uses of it. The Fiscal Court sent Mr. Gaines down to the quarries in Edmonson county, authorized to buy 2,500 tons if he could get it, f.o.b. Louisville, at a cost of not to exceed \$7 a ton, which he could and did. It is stated that if a sufficient amount were used, it could be freighted to Louisville by water, crushed and rolled and ready for application, for \$3 a ton. If so it would be the cheapest road material possible in Louisville. This material is said to retain its "life" for a long period after being laid. Where fresh material was applied in repairing the Taylor boulevard, the new material combined with the old as effectively as though both were of the same age. It is not muddy or slippery, while its viscous surface holds any dust which may fall upon it.

The Eighteenth street road out of Louisville has been macadamized for years, and in late years has been oiled at intervals, according to the best engineering practices. It carries a very heavy travel from a rich gardening section and from the back country, being an old thoroughfare, on account of which and extensive use by automobiles it has been costly to keep up. The foundation is deep and well laid, and has been consolidated for generations by the traffic. The section which is being resurfaced lies fairly level.

With a ten-ton roller the surface is scarified thoroughly and then receives one course of crushed limestone two to three inches thick, of stone approximating two inches in diameter. Little inequalities are carefully filled and the whole leveled and rolled with a ten-ton roller. On this surface the raw rock asphalt is spread cold, just as it comes from the rollers at the quarries. It does not work well in cool weather, a temperature of 60 degrees Fahrenheit being necessary to make it work readily, and rain chills the oils and retards the bonding of the particles. On sunny summer days, however, progress is rapid. It is handled practically in the manner of sheet

asphalt dumped on the sub-grade and raked to a uniform thickness by laborers. Then with a five-ton roller the surface is rolled and re-rolled two or three times a day for a week, after which the road is ready for traffic.

The rock asphalt is spread at the rate of 100 pounds to the square yard in this instance, though ordinarily a ton will suffice for 25 square yards. On days when conditions are favorable it is laid at the rate of from 600 to 750 lineal feet on this 16-foot roadway. On hot days the rock asphalt has a tendency to stick to the wheels of the big roller, but this can be overcome by applying a thin coat of lubricating oil to the wheels. Ordinarily about a quarter of a mile of the road at a time is closed to traffic and is barred off for about a week, at the end of which, after the repeated rollings, it is opened to all comers. Rolled and re-rolled, the rock asphalt is reduced to a sheet about $\frac{3}{4}$ of an inch thick over the sub-grade, though of course the roller forces the material into the voids in the course of crushed rock, forming a lasting bond.

Shoulders of water-bound macadam from 3 to 4 feet wide are being built on each side, the top slightly higher than the surface of the rolled rock asphalt. This macadam berm is built in the most approved manner of coarse rock, rolled with the ten-ton roller, and a second course of screenings, also rolled with the heavy roller and watered liberally. The fact that this macadam will get only a limited amount of travel, as when teams turn out in passing, will insure a long life for it. Mr. Gaines believes that the ideal shoulder would be concrete, but this would increase the cost to too great a figure for the present job.

When traffic is admitted to the freshly rolled rock asphalt surface, the calks on the horses' shoes pick up particles of it, leaving small holes, and wagon wheels rut it to a considerable extent, as in the case of soft asphalt. However, as the traffic continues, the whole surface is ironed out smooth as an asphalted street and appears to knit and pack harder and harder as use of it increases. As the dust which accumulates from horse manure and other sources is driven into the surface, it becomes smooth, much like asphalt. Like asphalt, too, it washes clean with every hard rain and there is no dust from the material itself.

All in all, Mr. Gaines thinks very highly of the rock asphalt as a road material. While it costs about twice as much as macadam, it gives ten or more times the service, and is considered to offer many possibilities to small towns and municipalities which cannot afford the outlays necessary for brick pavements, while for carrying rapid automobile traffic it is said to meet every requirement. The cost is said to be something like one-third that of bituminous concrete or roads laid with a tar asphalt binder.

One advantage of the rock asphalt is that it can be laid without skilled labor. The roller engineers and the usual engineering aids, of course, are indispensable, but expert attention is no more required in preparing and handling this material than in spreading gravel. In the case of this Eighteenth street road work, Mr. Gaines figures the cost at from \$4,250 to perhaps \$4,500 per mile. That is with the rock asphalt at \$7 a ton. The outlay in this case for the asphalt is figured at \$2,625 per mile; handling costs at \$194; cost of preparing the old roadway, \$230; cost of new rock for the first course, \$1,000; spreaders' wages, \$50; ten-ton roller, \$40; five-ton roller, \$30. Incidentals develop now and then which run the costs up, as for instance when deflected traffic cuts the sides of the rights of way to pieces. With the rock asphalt at \$3 a ton, of course, the cost would be very considerably reduced.

The WEEK'S NEWS

Kansas Good Roads Days—New Lincoln Highway Loop—Typhoid in Providence—New York City Gives Up Fumigation—Metering in Salt Lake City—New Auto Apparatus—New York State Home Rule Constitution—Beaufort, S. C., City Manager Dismissed—Trenton and Albany Fight Trolley Companies—Jitney News—Ohio Flood Prevention Plans—Grade Crossing Elimination in Milwaukee.

ROADS AND PAVEMENTS

Good Roads Days in Kansas.

Topeka, Kan.—In spite of threatening weather in some parts of the state, the two Good Roads Days proclaimed by Governor Capper were very successfully observed. The movement extended, according to reports, into almost every county in Kansas. It is estimated that thousands of dollars' worth of work was done, the merchants and the professional men co-operating with farmers. The governor himself, heading an organization of state-house employees, armed with picks, shovels, plows and drags, worked some of the stretches of bad roads in Shawnee county. Because of recent rains a number of the main traveled roads through the state, such as the Santa Fe Trail, the Rock Island Highway, the Red Line, the Golden Belt, Meridian and other roads, were in an unsatisfactory condition, and reports received indicate that much work was done on these. Plans had been announced for the dragging of the Red Line from the Missouri line to Colorado, through local organizations.

New Oregon Scenic Highway Opened.

Portland, Ore.—A new and important unit of the coast highway extending from the Columbia river to San Francisco has been completed and dedicated to the public. It is a two-mile stretch of road, chiseled from the basalt of Cape Perpetua, hundreds of feet above the beach. It was constructed by the United States Forestry Bureau. Various sections of the Columbia river highway are being completed and the drive from Portland to The Dalles goes through wonderful scenery. The illustrations show a scene on the Cape Perpetua road and the bridge near Shepherd's Dell on the Columbia river highway.

Select Loop of Lincoln Highway.

Washington, D. C.—The route of the Baltimore-Washington loop of the Lincoln Memorial Highway, which will connect New York and San Francisco in a coast-to-coast good roads system has been selected by the Lincoln Memorial Highway Committees of Baltimore, Washington and Maryland at a joint meeting. The route is composed of completed sections of Maryland's state road system and is the shortest that could have been picked. The entire route in Maryland from the Delaware state line through Baltimore and Washington to the Pennsylvania state line

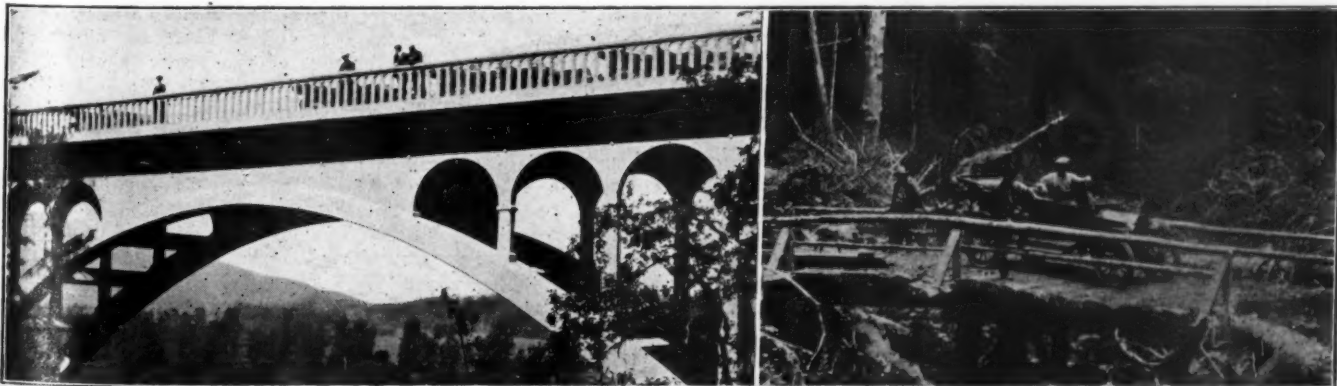
is ready for travel and all that is necessary to complete is to post the markers. The highway follows the turnpikes, through Chester into Wilmington, the Delaware end of it being in bad shape. After leaving Wilmington and crossing the state line into Maryland, the route runs to Elkton, to Havre de Grace, to Belair into Baltimore. Upon leaving Baltimore the boulevard is followed to Washington. Out of Washington the old Union turnpike is taken to Norbeck, thence to Rockville, Gaithersburg, Ridgeville, Frederick, Emmitsburg, Thurmont on the Pennsylvania state line. From Thurmont to the Gettysburg Battle Field Park, where the main line is tapped, there is a gap of about five miles of incompleting road, which the Pennsylvania state authorities have promised to put into shape. The Wilmington-Baltimore-Washington route is a "feeder-loop," the main route of the highway branching westward from Philadelphia to Gettysburg.

City and Railroad Clash.

Meriden, Conn.—A clash between laborers of the New Haven Railroad and of Leonard Suzio, a paving contractor, was stopped by a squad of police, when Suzio, acting under orders of Mayor D. J. Donovan, had torn up a spur track at a crossing of the railroad. The work started suddenly about midnight and it was several hours before a railroad section gang with a lawyer arrived here. The mayor and the public works commissioners have tried to get the railroad to take out the track, on the ground that it is unnecessary and will interfere with the city's paving operations.

New Regulations on Contractors' Checks.

Albany, N. Y.—Criticism having been made by the state department of highways of the manner in which certified checks have been presented in the past by contractors who in many instances have not been financially able to undertake large highway contracts, has finally resulted in the inauguration of a new system of presenting certified checks. State Highway Commissioner Edwin Duffy will in the future insist that certified checks deposited by bidders upon highway contracts shall bear the same signature as that attached to the proposals in connection with which such checks are deposited. Upon the execution of the contracts and bonds, such checks will be returned to the respective bidders depositing them. Commissioner Duffy reserves the right to deposit certified checks in the bank pending the award of highway contracts and the



Courtesy, Portland (Ore) Evening Telegram.

OREGON'S SCENIC HIGHWAYS.

On Columbia River, near Shepherd's Dell.

On Cape Perpetua Road.

execution of the work. If this is done the moneys realized thereon will be returned to bidders. It is understood that in the past certified checks have been obtained by bidders who were permitted to present them through the arrangement made with certain banks, or some other medium, when the applicants were not able to secure them upon their own standing. The practice the department has found most unsatisfactory. It opened the doors for contractors with small plants or none at all to bid upon highway work requiring a large outlay of money.

SEWERAGE AND SANITATION

Typhoid in Providence.

Providence, R. I.—Two deaths have been recorded as the result of the typhoid fever epidemic now prevalent in this city. Of the 47 cases reported to the health department during the first three weeks in August, the health authorities say 35 are due to milk delivered by two dealers. Superintendent of Health Chapin said that on the route of one dealer 27 cases have been found, while 8 are among the customers of the second dealer. Dr. Chapin expects that when all the cases are reported, the victims of the infected milk of these two milkmen will total 79 or more. Prompt steps have been taken by the health and milk departments to prevent any further spread of the disease through the product of the two dealers. Dr. Chapin's records show that the 47 cases reported in the first 19 days of August are more than the total cases reported during the entire first six months of the year.

Sewerage Improvements for Lexington.

Lexington, Ky.—That it will take \$350,000 to complete the sewerage system and establish a sewage disposal plant for Lexington is the report received by the city commissioners from P. N. Norcross, a sanitary engineer of Atlanta, Ga., who was recently employed to make estimates on this work here. Mr. Norcross states that in his opinion \$260,000 will be necessary for the construction of sewage disposal plant and the completion of the sewers necessary to conduct the waste to the plant, and that probably \$50,000 will be needed to dispose of the storm water from the streets, while \$40,000 probably would be needed for purchase of a site for plant and rights of way. The city expects to raise the money for the purposes by a bond issue to be submitted to the voters at the November election.

Discontinue Fumigation in New York.

New York, N. Y.—After a year of testing the efficacy of fumigation in cases of contagious diseases the board of health has announced that the practice of fumigation in infectious diseases in Brooklyn will be immediately discontinued. That means that fumigation has given place to more advanced methods in all the boroughs. In December, 1914, the practice was discontinued in Manhattan, the Bronx, Queens and Richmond, but to satisfy critics and for the purposes of comparison it was continued in Brooklyn. Now Dr. Goldwater has ordered fumigation discontinued altogether. During the period when the health authorities were debating the efficacy of fumigation many experiments were made. The health department calls attention to other and more efficient methods of preventing the spread of disease, that is, cleaning, fresh air, and sunlight, and particularly the renovation of premises by repainting and repapering. Dr. Goldwater said that statistics gathered by the department show that the discontinuance of fumigation is justified. These show that there has been no increase in the prevalence of the various diseases and that better and more efficient disinfection has been performed. In abandoning fumigation, he said, the city has saved about \$30,000 a year. Under the new method the district nurses are instructed on the termination of any infectious case to visit the premises and give all necessary instructions regarding cleansing and disinfection to the occupants. If the premises were vacant and disinfection necessary, the nurse recommended to the owner or agent what was necessary for renovation. If they declined, formal orders were issued and enforced by the health department.

The nurses will not remove the department placards from the premises until satisfactory and necessary cleaning has been done. Statistics show that terminal fumigation in cases of scarlet fever and diphtheria in Brooklyn has not resulted in a decreased prevalence of those diseases as compared to the other boroughs where fumigation has not been practiced.

WATER SUPPLY

Salt Lake Metering for Economy.

Salt Lake City, Utah.—In its campaign for use of meters by the water consumers of Salt Lake, the water department has been installing new meters at a rapid rate. Since the first of this year the department has installed 800 meters. There are 25,000 water consumers in Salt Lake and records of the water department show that of this number 2,500 use meters, while the remainder are on flat rates. Mr. Barrett estimates that before the end of this year there will be not less than 3,000 consumers using meters. Meters are the only solution to the present water shortage problem, according to Superintendent Barrett, until the city completes its gigantic storage reservoir system now under way. W. H. Shearman, city commissioner in charge of the waterworks department, states that the only reason the department desired meters installed was for the moral effect. The department has figured that those who are using water on the meter system use 72.7 gallons daily per capita and those who are using water on the flat rate are consuming 129 gallons daily per capita. When all the reservoirs under construction and planned have been constructed, the storage capacity of the water system will be increased by 1,570,000,000 gallons.

Annapolis Water Supply Improved.

Annapolis, Md.—The Annapolis Water Company announces a number of new improvements in the supply. A modern and efficient chlorine apparatus for sterilizing the water is now in operation. The program of improvements after survey, investigation and consideration has been planned in conjunction with the advisory engineer, Alfred M. Quick, and it conforms to the requirements of the state board of health and has been approved by the city health officer, Dr. William S. Welch, and the county health officer, Dr. Walton H. Hopkins. The next step will be to increase the impounding capacity of the reservoirs, it being planned to double the clear water storage capacity and increase the total impounding capacity from 15,000,000 gallons to about 47,500,000 gallons. It is planned to follow this with the installation of a modern and efficient filter plant, with a coagulating basin. The plans also provide for the ultimate raising of the main dam at the waterworks to form an immense impounding reservoir of about 275,000,000 gallons capacity, which will give an assured supply of over 3,000,000 gallons a day from the present stream sources alone, or three times the present average daily consumption.

South Bend's Profitable Waterworks.

South Bend, Ind.—The operating revenue of the water department for the fiscal year ending last June 30 was an increase of \$19,365.25 over that of the previous year while the operating cost was reduced \$5,572.41. This is shown in the second annual report compiled by Supt. T. J. Toyne to E. M. Morris, president of the board of public works, for the utilities commission. In the fiscal year ending June 30, 1914, the operating revenue, according to the report, was \$110,032.84. For the last fiscal year the revenue was \$129,398.09. The commercial receipts for the last fiscal year amounted to \$111,330.77 and the industrial receipts amounted to \$7,811.26, making a total of \$119,142.03. The comparative operating expenses are given as follows: 1913-14 fiscal year, salaries and wages, \$34,475.22; repair material, \$3,823.90; fuel, \$11,463.92; fiscal year of 1914-15, salaries and wages, \$33,255.03; repair material, \$4,571.23; fuel, \$6,364.37. The pumpage in the 1913-14 fiscal year was 1,789,185,475 gallons. In the year just closed it was 1,798,668,507 gallons. There are 4,533 water meters in the city. Of this number 632 were installed in the last

year. Whatever is left over from the operating revenue is used liquidating the department's bonded indebtedness, which is \$148,000.

STREET LIGHTING AND POWER

Kansas Gas Fight in High Court.

Topeka, Kan.—Mandamus action to compel Judge T. J. Flannelly of the Montgomery county district court to dismiss the restraining order recently issued by him against the Kansas public utilities commission has been filed in the state supreme court by attorneys for the commission. The petition asked also that the court order the receivers of the Kansas Natural Gas Company to take such steps as are necessary to provide an adequate supply of natural gas in the state. The order which the commission's attorneys ask dismissed restrains the commission from enforcing its recent order providing for 28-cent gas. This was granted upon the plea of the receivers for the Kansas Natural who asserted that the provided increase was inadequate.

City Buys Light Plant.

Chillicothe, Mo.—A contract has been entered into by the Board of Public Works and the Peoples Gas and Electric Company by which the city purchased the electric light plant, which is owned by an Iowa corporation, for \$13,000. The city will take charge of the plant as soon as the state utility commission grants the company permission to make the sale. The sale includes the distribution system. This means that all old dead poles scattered over the city will be removed. On many streets both lines traverse and the city will change the wires over to the regular city line and remove the old poles.

Considering Building Municipal Plant.

Canton, Ill.—The committee on lights to which was referred the task of investigating and estimating the cost of installing a municipal lighting plant to be operated in connection with the pumping station of the city water system, has reported to the council recommending that such a plant be installed. The approximate cost is estimated at \$38,399. The committee recommended that the question of the issuance of bonds for the plant be voted upon by the people. The city of Canton has at present 210 street lamps exclusive of the ornamental lights on the square and the park lights and the figures of the proposed new plant are for double the number of lights that Canton now has. Manager Negley of the Canton Gas and Electric company has stated his company was ready to lower the cost of street lamps to the city at the expiration of the contract, which soon expires. The plans were made by O. W. Brickner, city engineer, and L. H. Wallace, chief engineer of the pumping station. The city will have a chance to vote on the proposition.

MOTOR VEHICLES

Complete Massillon's Motorization.

Massillon, O.—The new motor combination truck for No. 3 engine house has arrived and been accepted by the officials after its test. The motorization of the city's fire apparatus now is complete. The Seagrave company of Columbus received the contract to supply the city with the two new machines, one already placed in the central engine house two weeks ago.

County Buys Road Truck.

Pensacola, Fla.—The big five-tone White motor truck, ordered by the county of Escambia some months ago, has arrived and been turned over to the commissioners. The machine will be sent out in the country for work on the roads and is expected to aid materially in road building at a reduced expense. The truck has a capacity of five tons and will also haul at the same time a number of the regular road wagons as trailers. The machine will not cut up the roads but will build them. The wheels are equipped with steel tires, twenty inches in width and will have practically the same effect as a road roller.

Chemical in Service.

Wilkes-Barre, Pa.—The new chemical truck for No. 3 house has arrived from the plant of the International Motor Company at Allentown and been put in service. The arrival of the truck completes the entire equipment of motorized apparatus for the new No. 3 house.

New Pumper Performs Well.

Chicopee, Mass.—The new Robinson pump located at the East street station proved itself fully capable at a test witnessed by chief Hurley of Holyoke, fire commissioner James H. O'Connell of Holyoke and district chief Burton Steere and lieutenant Charles S. Taylor of the Springfield fire department. The results were: Three 100-foot lines of hose into a deluge set with ½-inch tip, 115 pounds at nozzle, 130 pounds at pump, 15-inch vacuum, delivery of 715 gallons per minute; three 100-foot lines, 2-inch tip, nozzle pressure 75 pounds, pump pressure 100 pounds, 15-inch vacuum, delivery of 1,040 gallons a minute; two lines of 100 feet each, 2-inch tip, vacuum 15 inches, 68 pounds at nozzle, delivery of 980 gallons a minute; three single lines of 200 feet each, 1½-inch tip, 85 pounds at nozzle, delivery of 1,065 gallons a minute; two 300-foot lines, 1¼-inch tip, 150 pounds pressure at pump, delivery of 772 gallons a minute. Chief Pomphret was well pleased with the showing of the machine. The new hook and ladder has also been received.

GOVERNMENT AND FINANCE

Home Rule in New York's New Constitution.

Albany, N. Y.—After long debate, the Constitutional Convention by a vote of 91 to 17 advanced to final reading the revised home rule article recently reported by the cities committee, of which ex-Mayor Seth Low of New York City is chairman. Many amendments were offered, but all, except those which made trifling changes as to language, were voted down by overwhelming majorities. The Citizens' Union proposed amendments directed very largely against the provisions in the home rule article giving the legislature power to annul legislation affecting municipalities. They were defeated. Under the revised home rule article cities will have the right to amend their own charters, subject to ratification by the city electors and to legislative annulment. The procedure in New York City would involve a referendum on the question whether there should be general charter revision at the general election next year and the election then of sixteen charter commissioners, nine chosen throughout the city at large, two each from the boroughs of Manhattan and Brooklyn, and one each by the voters of the other three boroughs. The new charter when drafted must be submitted to the voters for ratification either at a special election or the next following general election and then submitted to the legislature, which would have power to annul it at any time prior to July 1, 1918. Afterward the board of aldermen, with the approval of the board of estimate and the mayor, would have power to enact measures affecting New York City without legislative approval when they had reference to the management and control of the "property, affairs, and municipal government, subject only to the constitution and to the general laws." Any measures adopted which have to do with the "framework of government or which modify restrictions as to issuing bonds or contracting debts" must be submitted to the legislature. The legislature is restricted in its relation to municipalities to the enactment of general laws affecting all cities alike, regardless of class.

To Check City Extravagance.

St. Paul, Minn.—Convinced that city departments are buying extravagantly and needlessly, Purchasing Agent Hohenstein has announced that he will institute an era of official economy by demanding that every requisition which comes to his office be supported by an acceptable reason for the proposed expenditure of city cash. If their actions in recent weeks may be taken as an indication, Mayor Powers and Comptroller Handy will back Mr. Hohenstein in this crusade against ill-advised buying, and

will veto purchase orders even after they have been passed by the council, unless indisputable reasons are given for their approval. The declaration of the purchasing agent is significant, coming at the time when Comptroller Handy is using the axe on the commissioners' estimates of expenditures for 1916. The mayor, comptroller and purchasing agent, according to the charter, have the final word in the matter of expenditures.

Indifferent to Charter Change.

Norfolk, Va.—Failure of the required number of voters to go to the polls caused the defeat, at present, of the movement to change Norfolk's charter. Of the 2,136 votes cast, 2,001 were in favor of the change, 67 opposed it and 68 ballots were thrown out. As there are more than 8,000 qualified voters the required majority was not obtained.

City Manager Dismissed.

Beaufort, S. C.—Mayor Danner and councilman Marscher voting yes and councilman Richardson voting no, the council has dismissed city manager Horne, the discharge to take effect immediately. This culmination of the back tax collection fight was witnessed by the largest crowd that has attended council meeting in years. A citizens' meeting, after the council session, decided to invoke the recall against Mayor Danner and councilman Marscher. The petition already has received a sufficient number of signatures to insure an election. Mayor Danner stated that while he agreed that the collection of back taxes should be made he was opposed to the drastic methods by which the city manager had been attempting to collect them.

Court Decides Bonds Invalid.

Durham, N. C.—Judge Oliver H. Allen has decided that the Durham water bond election which was held in the spring of 1914 was invalid, because the notices of the new registration were advertised only 20 days instead of 30 days, and the registration books were kept open eight days instead of 20 as the law requires. The city contended that in view of the fact that the election was one of the biggest that has ever been held in Durham and because it had been given wide publicity that it was in substantial compliance with the law and really did represent the free will and desire of the majority of the qualified voters of the city. Judge Allen made no finding of the facts in the case, leaving all of the evidence to go before the Supreme court for a decision there. The attorneys for the city gave notice of an appeal and will begin preparing their briefs at once. The decision leaves the city facing the proposition of taking care of the contractors to whom work has been let which will amount to a quarter of a million dollars.

City Engineer Says Mayor Cannot Dismiss Him.

Seymour, Ind.—E. B. Douglass, who has held the office of civil engineer for almost eight years, has been asked by Mayor John A. Ross to resign and surrender his keys, but refuses to comply on the ground that the power of dismissing him rests solely with the city council. That the demand of the mayor might be enforced, a padlock has been placed on the door of the engineer's office in the city building, so that he can not enter except when accompanied by a policeman, in whose possession the key was placed. Reasons for demanding the resignation were not made public by the Mayor, although it is said he questions the ability of the engineer to supervise certain work now in progress. Mayor Ross contends that as he has the power to appoint the civil engineer, he also has the authority to dismiss him as he sees fit. Douglass, it is reported, asserts there is no justifiable ground on which he can be dismissed, and also declares that under Indiana law charges must first be filed with the council and a regular trial conducted and that it requires a two-thirds vote of the council to dismiss him.

Another Iron Range Town in Trouble.

McKinley, Minn.—The town of McKinley, on the iron range near Biwabik, is in the same condition of financial stringency as Hibbing, according to a motion filed in the supreme court by Joe P. Ahlin, president of the village. The McKinley difficulty arose over the election of March 6, at which a big area of territory was annexed to the village. People who opposed the annexation, through Attorney

General Lyndon A. Smith, filed a writ of quo warranto in the supreme court on the ground that the election was irregular. It is claimed that those interested in seeing the additional territory brought within the corporate limits of the village, imported "floaters" and voted them at the election in order to get the required number of votes. Since the village became involved in litigation as a result of the election the banks refuse to accept village warrants and the council finds itself in a state of financial embarrassment. The motion filed by Mr. Ahlin recites that the village water plant, which is located on the annexed territory, is in need of repair. He says the waterworks plant must be fixed before cold weather or the people will be without water.

RAPID TRANSIT

City May Buy Trolleys.

Trenton, N. J.—As a result of the attempt of the Trenton and Mercer County Traction Corporation to abolish the sale of six tickets for a quarter, it is possible that municipal ownership of the system will be the outcome. Mayor Donnelly, in a recent address, said that public ownership of the trolley line seemed to be the only way "to combat the pernicious influence of the traction octopus." He declared he would start at once to gather data on the subject and then submit the proposition to the people through the initiative and referendum. The State Board of Public Utilities has called for a hearing on the rate raise.

Albany Wins Trolley Fight.

Albany, N. Y.—The United Traction Company must rehabilitate its rolling stock in the city at a cost of between \$100,000 and \$200,000, increase the number of available cars by about 50, and increase the seating capacity between 400 and 500, according to an order issued by the public service commission. The commission issued an order last December directing the company to make sweeping improvements. The company appealed to the courts and the Third Appellate division sustained the commission with the exception of one minor point in its order. Following the victory in court, the commission granted additional hearings in May and June, and the present order is the result of these hearings.

Mayor Runs Jitneys.

West New York, N. J.—Angered by the refusal of the Public Service Railway Company to place additional cars in service in this town, Mayor Oscar Auf der Heide, who is also a freeholder, has started a jitney bus line in opposition to the trolley company. The mayor has placed four cars in service and will run them over the same route as the trolley cars.

New Jitney Legislation.

Charlotte, N. C.—The board of aldermen has finally adopted the jitney regulating ordinance which had been drafted by a special committee. According to the ordinance, owners must file schedules and routes with the Executive Board before beginning operations. A bond of \$1,500 is required of the first bus and \$1,000 for each succeeding bus and in the event of suit brought against a company on account of damage in a sum exceeding the amount of the bond the question of whether another bond of like sum should be required is left with the mayor and the Executive Board. It is provided that each violation of the ordinance will subject the offender to a fine of not more than \$50.

Haverhill, Mass.—Taking the stand that the city council is not obliged to assume any responsibility for the safety of passengers as far as compelling jitney owners to submit a bond or accident insurance liability, but that in making regulations for the operation of vehicles it had done all that was necessary, the council has passed the new jitney regulations after cutting out the entire section relating to liability insurance for injured passengers or damaged property. The new jitney regulations will become operative September 1. The regulations require that signs bear-

ing the terminals must be posted on the machines; that no vehicle shall pass an electric car while it is taking on or discharging passengers; no vehicle shall stop within 50 feet of a transfer station of a street car company; drivers are not permitted to smoke or call attention to his car by making any unusual demonstration; the interior of the cars must be lighted, and no car can carry more passengers than the seating capacity. The clause which stated that only male chauffeurs could be employed was stricken out and the regulations do not prohibit women from operating jitneys. Operators must be 21 years of age unless they get a special permit from the council.

Charleston, S. C.—An ordinance regulating the operation of jitneys, which was drafted by the mayor, has been adopted by the city council. A number of amendments were asked by the jitney interests. The license fee of \$4 per seat, based upon the seating capacity of each jitney, including the driver, was changed to \$3 per seat, and excludes the driver. That portion of the bill allowing occasional deviations from scheduled routes by the jitneys for the purpose of discharging passengers was eliminated. Absolute authority of the committee on streets to suspend or permanently discontinue the operation of a jitney or jitneys over any route or routes when it is considered for the public welfare was changed, so that final decision in any such matter shall rest with the council. The maximum bond to be required from any jitney company was fixed at \$25,000.

Dallas Jitney Fight Ended.

Dallas, Tex.—By an agreement between the city commissioners and the jitney men, a new ordinance, embodying the principal demands of the drivers, except the reduced license fee, will be passed by the board of commissioners at the next session. Under the agreement, the petitions recently filed for an initiative election on an ordinance and all pending litigation between the city of Dallas and the jitney men will be withdrawn. The new ordinance will be passed with an emergency clause to secure immediate settlement of the jitney dispute which has lasted for six months. The principal demands of the jitney men are granted either fully or in part. Even the subject of license fee has been arranged, although the original fee of \$75 still stands; it has been agreed that upon the payment of an additional \$10 two men may operate the same jitney. Under the original ordinance each additional driver had to pay a fee of \$75. Under the law as amended, \$5 per annum will be charged for the car, \$10 for the driver and \$10 for each additional driver. The requirement that each car shall stay on its route six consecutive hours each day will be changed, but the manner of changing this could not be ascertained. Under certain conditions, drivers will be allowed to leave their routes, which was denied under the old ordinance. In agreeing on the ordinance the city commissioners, it is said, were actuated by a desire to save the city the expense of another election, as the petition of the jitney men for an election is said to have contained 4,000 names, enough to insure its passage. The appeal to the people was made by the jitney men after the granting of an injunction restraining the city had been refused.

The Difficulties of Jitney Regulation.

Richmond, Va.—Following the signing of the jitney ordinance by Mayor Ainslie, it went into effect ten days later, and only three of the 105 jitneys operated in violation of the law. Attorneys O'Flaherty, Fulton & Byrd, for the Jitney Owners' Association, were granted a temporary injunction by Judge Ernest H. Wells, of Hustings court, part 2, restraining the city from enforcing the ordinance. The petition recited how the Virginia Railway & Power Company, failing to procure an injunction against jitney owners in the law and equity court and in the supreme court of appeals, "organized a subsidiary corporation for the purpose of destroying" the business of the independent jitney. Failing in this, the petition stated, the Virginia Railway & Power Company concentrated its energies upon the city council and brought about the passage of the ordinance now being attacked. Since the city has issued licenses to the jitneys, authorizing them to conduct their

lawful business until January 31, 1916, it cannot now revoke any of their rights, the bill declared, and if the city should deprive the jitney owners of their rights the fourteenth amendment of the constitution of the United States would be violated. The city filed a demurrer, and at a hearing it was upheld and the temporary injunction restraining enforcement was dissolved. Stay was granted for a day so that appeal could be made. The jitney owners' counsel appealed and Judge Keith of the Virginia supreme court extended the injunction until the appeal be argued.

Providence, R. I.—In spite of protests from the jitney men and opposition from within the council, the amended jitney ordinance did not cut the bonding rate from \$500 to \$250 per seat as had been expected. The Jitney Protective Association decided to fight the ordinance. An attempt was made on the plea of unconstitutionality, to obtain a preliminary injunction to restrain enforcing of the ordinance, but Judge Sweeney, in the superior court, refused to grant it, holding that the constitutionality of the ordinance was not concerned as the ordinance had been drawn under the enabling act of the legislature and the legislative act had not been attacked in the bill of complaint.

MISCELLANEOUS

To Buy Out Village in Ohio Flood Plans.

Dayton, O.—In line with the plan for prevention of future floods such as wrought disaster to this city and the Miami valley in March, 1913, it is proposed to buy up and destroy the entire village of Osborn, Greene county, with its 400 families and almost one thousand population. The flood conservancy commission has perfected plans for acquiring all of the property of the village and raising the dam at a cost of approximately \$1,500,000 and at a saving of about \$1,000,000. Under the new plans, Osborn will lie in the great storage basin back of the lower Mad river dam. The upper Mad river dam will be abandoned and the lower dam on the Mad river below Osborn will be raised 15 feet. Under this new plan Osborn, in event of a big flood, would be under 15 feet of water. Commissioners of the conservancy district estimated that the cost of building a great reservoir to make Osborn safe from flood danger would be far greater than razing the property located there. Property owners have agreed to the terms.

Columbus, O.—The Franklin county flood conservancy board has decided to extend the scope of its study of flood protection plans to the counties in the Scioto river watershed, north of Columbus, as well as to the counties south of Franklin county, and invited the co-operation of these counties, with the end in view of expanding the conservancy district, at present confined to Franklin county. Recent floods in Hardin county and other sections of the Scioto river watershed have resulted in a desire of some of the people interested in flood protection in the upper counties to join with Franklin county in a general flood protection scheme. Alvord & Burdick, Chicago engineers, have already entered into a contract with the flood commissioners to have charge of the flood protection plans and act in an advisory capacity to the commissioners at \$10,000 a year. The engineers are instructed to include in their survey the Scioto river watershed, including Delaware, Marion, Union and Hardin counties. Pickaway, Ross, Pike and Scioto counties, through which the Scioto passes south of Franklin county, are also invited to co-operate with the Franklin county district, as all these counties are interested in preventing the overflow of the Scioto river. According to the contract entered into with Alvord & Burdick, the engineers are to furnish such engineering forces as may be necessary to carry forth the project with dispatch. They will employ the engineers, assistants and clerks, subject to the supervision of the board, the district to pay the cost. The \$10,000 a year to be paid Alvord & Burdick is for their professional service. The contract is not for any specific term, but their services may be terminated by either party upon thirty days' notice. The conservancy board has certified to the county auditor the levy of three-tenths of a mill on all the real property of

the county, to be collected at the December collection of taxes. County Auditor Sayre, secretary of the conservancy board, is preparing for the assessment as county auditor and is also preparing books and records to be used by the conservancy board.

Piqua, O.—The county commissioners and prosecuting attorneys of Miami, Shelby and Clark counties are to employ attorneys and an expert engineer to continue the fight in the courts against the reservoir plan of flood protection for the Miami valley. It is proposed that since the conservancy district had been established by a vote of five to four of the common pleas judges, exceptions should be taken to the elimination of Logan county by the conservancy court and that the same be taken to the court of appeals on error and, if necessary, to the supreme court. It is stated that there are several grounds of error, one of which was permitting Miami county to remain in the conservancy district after the request had been made to eliminate the same; another was the elimination of Logan county. Prosecutor Frank C. Goodrich of Miami states that any expenditure of money to fight what is believed to be a damage to the county would be considered lawful and he has recommended to the Miami county commissioners to appropriate the necessary money.

Model Town for Alaska.

Seward, Alaska.—Citizens of the new town of Anchorage, the Cook's Inlet headquarters for the Alaska Engineering Commission, have begun preparations to create a model village, following the completion of the government's first sale of town lots. Out of 1,178 lots offered, 635 were sold for a total of \$147,235. There will be another sale this month. Under the supervision of the United States Land Office, Anchorage is to be made a model town in every respect. J. A. Moore, manager of the town, for the government, is mayor. He has issued strict rules regarding building and sanitation. The engineering commission there is directing the construction of the government railroad between Seward and Fairbanks.

City Must Pay for Crossing Elimination.

Milwaukee, Wis.—Under a decision handed down by Judge E. R. Stevens of the Dane county circuit court, the order of the railroad commission that the city of Milwaukee pay 25 per cent of the cost of railroad elevation and depression work is sustained. This means that, unless the decision is overruled by the supreme court, the city must pay nearly \$1,500,000 of the work on the northwest side and the Layton Park district. City Attorney Daniel Hoan took immediate appeal to the supreme court. The decision was the outcome of the appeal taken by the city from the order of the railroad commission which directed it to contribute towards the cost of track elevation and depression at crossings of the Chicago, Milwaukee & St. Paul road and Milwaukee Electric Railway & Light Company within the city limits. The work was done by order of the common council and the city contended among other things that the improvement would be a financial benefit to the companies. The railroad commission decided that Milwaukee would have to pay 25 per cent of the cost of the work. The city filed complaint, which was demurred to by the commission. Judge Stevens' decision sustains the demurrer. Judge Stevens holds that the order of the commission is a lawful exercise of police power, properly vested in it by the state, to require the city to contribute to a change in railway crossings which will promote public safety and welfare. The only question raised by the plaintiff, he says, was the right of the commission to apportion any part of the cost and expense against the city. The city did not raise the question as to the amount of percentage of cost and expense which was apportioned against it. City Attorney Hoan claims that under the franchise, granted the railroad companies under the city charter the companies are compelled to pay all of the costs of track depression and elevation work. Judge Stevens' decision holds that the charter of the city is no more invulnerable to repeal than any general statute.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Streets—Negligence.

City of Meridian v. Crook.—That the bricks in a sidewalk became loose and some of them were missing, leaving a depression about three inches in depth, does not show negligence on the part of the municipality, authorizing a recovery by a pedestrian who tripped and fell in stepping into one on the holes.—Supreme Court of Mississippi, 69 S. R., 182.

Discretionary, Judicial or Ministerial Duties.

Walters v. City of Carthage.—Municipal corporations exercise discretionary or judicial powers in selecting plans for public improvements, and are not liable in damages for the manner in which they in good faith exercise such powers. But it acts ministerially in maintaining a fire station, and is liable in damages for neglecting to make it safe.—Supreme Court of So. Dakota, 153 N. W. R., 881.

Streets—Vehicles—Negligence.

American Express Co. v. Ferry.—Automobiles and motor trucks, being lawful means of conveyance, may be used on the public streets and highways, and it is not negligence per se to leave a motor truck unattended in a public street, although it is the duty of the driver to exercise the care of a person of ordinary prudence under the circumstances.—Court of Appeals of Maryland, 94 A. R., 1026.

Powers of Cities—Engaging in Business.

Andrews v. City of South Haven.—Under Const. art. 8, Section 23, authorizing municipalities to own and operate public utilities for supplying water, heat, etc., and Comp. Laws 1897, Sections 3258, 3269 and 3270, authorizing municipalities to acquire and operate gas and electric light plants, a city which operates its own electric light plant is entitled to do all those things naturally connected with and belonging to the running of such a business, and so may sell, if necessary, light fixtures.—Supreme Court of Michigan, 153 N. W. R., 827.

Streets—Beach—Adverse Possession.

F. A. Hihn Co. v. City of Santa Cruz et al.—Where a city went upon beach land and took possession under a claim of grant from the state, erected improvements occupying the entire surface, changed the character of the land so as to render it unfit for any other use than that of a public highway, and maintained it as such highway for more than 20 years, there was an adverse possession giving it ownership of at least an easement coextensive with its use; but as to land which it never improved by any permanent structure but left open, undistinguished from the adjacent tidelands, and used by the public generally, and not merely by its own inhabitants, for walking, bathing, etc., without objection by it, the mere fact that it passed and enforced ordinances regulating the use of its public lands was not sufficient to establish its prescriptive right therein.—Supreme Court of California, 150 P. R., 62.

Smoke Ordinance—Reasonableness and Validity.

People v. Detroit, B. I. & W. Ferry Co.—Where the evidence of expert marine engineers showed that there was no known appliance which could be used upon marine boilers to prevent the emission of smoke, an ordinance declaring that the emission of dense, black or gray smoke from any smokestack used in connection with any steam boiler in any boat, etc., within the city limits should be a public nuisance per se, and that the owners of any steamboat and the general manager, fireman or other employee having charge of any steamboat within the city permitting it to emit such smoke should be guilty of creating a public nuisance and of a violation of the ordinance, was unreasonable and invalid, though its invalidity was not a bar to a future prosecution thereunder if practical and efficient appliances might be had, or to liability for a common-law nuisance.—Supreme Court of Michigan, 153 N. W. R., 799.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 31-Sept. 3.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, Cincinnati, O.

September 6-13.
INTERNATIONAL HEALTH CONGRESS, to meet with the American Public Health Association, the 15th annual conference of the New York State Health Department and the New York State Sanitary Officers' Association.—Rochester, N. Y.

Sept. 7-9.
NEW ENGLAND WATERWORKS ASSOCIATION.—Annual Convention, New York City. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 7-9.
NATIONAL FIREMEN'S ASSOCIATION.—Annual Convention, Rockford, Ill. Secretary, W. F. Gillooley, Davenport, Ia.

September 7-10.
LEAGUE OF CALIFORNIA MUNICIPALITIES.—Eighth Annual Convention, Oakland, Cal. Secretary, H. A. Mason, Pacific Building, San Francisco.

September 7-11.
CALIFORNIA CONFERENCE ON CITY PLANNING.—Oakland, Cal. Secretary, Charles H. Cheney, Crocker Bldg., San Francisco.

Sept. 13-19.
PAN-AMERICAN ROAD CONGRESS.—Held by American Road Builders' Association and the American Highway Association. Oakland, Cal.

September 14-16.
IOWA LEAGUE OF MUNICIPALITIES.—Annual Convention, Council Bluffs. Secretary, Frank G. Pierce.

September 16.
PACIFIC HIGHWAY ASSOCIATION.—Annual Convention, San Francisco, Cal. President, Samuel Hill, Maryhill, Wash.

September 16-18.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—Convention, San Francisco. Secretary, Charles W. Hunt, 226 West 57th St., New York City.

Sept. 16-18.
AMERICAN ELECTROCHEMICAL SOCIETY.—Twenty-eighth annual general meeting, San Francisco. J. M. Muir, 239 West 39th street, New York City, Chairman of Transportation Committee.

September 16-18.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Convention, San Francisco. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

September 16-18.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—Convention, San Francisco. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

September 16-25.
INTERNATIONAL ENGINEERING CONGRESS.—Am. Soc. C. E., Am. Inst. Min. E., Am. Soc. Mech. E., Am. Inst. E. E. and Soc. N. A. & M. E., San Francisco, Cal. Secretary, W. A. Catell, Foxcroft Building, San Francisco, Cal.

September 20-23.
ILLUMINATING ENGINEERING SOCIETY.—Ninth annual convention, New Willard Hotel, Washington, D. C. Secretary, C. A. Littlefield, 29 West 39th Street New York.

Sept. 22-24.
MASSACHUSETTS STATE FIREMEN'S ASSOCIATION.—Annual convention, Haverhill, Mass. George Wilson, Lynn, Mass., Chairman of Committee.

September 23-24.
JACKSON HIGHWAY ASSOCIATION.—Convention, Nashville, Tenn.

September 27-30.
SAFETY CONFERENCE. San Francisco.

Sept. 27-Oct. 1.
PACIFIC COAST FIRE CHIEFS' ASSOCIATION.—Annual Convention, San Francisco. Secretary, Harry W. Bringhurst, Fire Marshal, Seattle, Wash.

September 27-October 1.
INTERNATIONAL GAS CONGRESS AND AMERICAN GAS INSTITUTE. Convention, San Francisco. Secretary, George C. Ramsdell, 29 West 39th St., New York City.

Sept. 29-Oct. 1.
MASSACHUSETTS STATE FIREMEN'S ASSOCIATION.—Thirty-sixth Annual Convention, Haverhill. Secretary, D. Arthur Burt, Taunton.

October 4-6.
NORTHWESTERN GOOD ROADS CONGRESS.—Annual Convention, Cedar Rapids, Ia. Secretary-treasurer, J. P. Kennan, Milwaukee, Wis.

October 4-9.
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—Convention, San Francisco. Secretary, E. B. Burritt, 8 West 40th St., New York City.

Oct. 5-8.
PENNSYLVANIA STATE FIREMEN'S ASSOCIATION.—Annual Convention, Philadelphia. President, Miles S. Humphreys, Pittsburgh, Pa.

October 6-8.
NATIONAL HOUSING ASSOCIATION.—Minneapolis, Minn., Secretary, Lawrence Veiller, 105 East 22d street, New York City.

Oct. 11-15.
NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION.—Annual Convention, Dayton, O. Secretary, Will F. Blair, B. of L. E. Bldg., Cleveland, O.

October 12-15.
AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Annual Convention, Dayton, O. Secretary, Charles Carroll Brown, 702 Wulfin Bldg., Indianapolis, Ind.

November 9-12.
ATLANTIC DEEPER WATERWAYS ASSOCIATION.—Eighth Annual Convention, Savannah, Ga.

November 17-19.
NATIONAL MUNICIPAL LEAGUE.—Annual Convention, Dayton, O. Secretary, Clinton Rogers Woodruff, 705 North American Bldg., Philadelphia, Pa.

Dec. 27-Jan. 8, 1916.
SECOND PAN-AMERICAN SCIENTIFIC CONGRESS.—Washington, D. C., Department of State, Washington.

February 15-18, 1916.
SECOND NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING.—Secretary, J. P. Beck, 208 S. LaSalle St, Chicago, Ill.

National Tax Association.

The ninth annual convention of the National Tax Association was held at San Francisco, August 12-14.

Seventeen recommendations for changes in the present federal income tax law were made by a committee of the association. The association supported the recommendations.

According to the report of the committee, there seems to be no demand for the repeal of the law, but "there is, however, a general dissatisfaction with its complexity and strong objections to several of its provisions, which are contrary to the principles of just taxation, work unnecessary hardship and result in unfair discrimination between various classes of taxpayers."

The chief recommendations of the committee were summarized as follows:

"That the system of collection-at-source be abandoned and a system of information-at-source substituted, except as to non-resident American citizens, and as to non-resident aliens to the extent that they are taxable.

"That partnerships should be treated like corporations in the collection of the normal tax.

"That individuals should be allowed to deduct all losses, whether incurred in trade or not; also all expenses of managing investments.

"That the exemption should be lowered to \$2,000, on the ground that the tax should rest upon a larger proportion of the population.

"That all persons having a gross income equal to the minimum exemption

should file returns instead of, as now, only those who themselves decide that their net income is over the exempt amount.

"That corporations should not be taxed on dividends received from other taxable corporations."

E. H. Wolcott, member of the Indiana State Tax Commission, in an address condemned general property taxation as it exists in some states as "ineffective and unenforceable." The trouble was, he said, in taxing intangible property under a general law, such as mortgages, stocks, bonds and the like.

Mr. Wolcott recommended as a substitute a "system of classification of certain properties for taxation purposes." He cited the general property tax law of Indiana as one covering "a multitude of sins, the sins of omission," under which "the amount of property that escapes taxation cannot be definitely computed."

George Lord of Detroit, secretary of the Michigan Tax Association, urged the formation of a national organization of state tax officers.

"I believe a national association of this character," Mr. Lord said, "would do more than any other agency toward a solution of the vexed tax problem with which many, if not all, of the states are confronted. The trouble with our tax system is not so much statutory as administrative. No state, I think, is suffering to a great extent because of too little tax legislation. It is not new tax legislation that we most want, but a simplification of the laws we already have and improved methods of their administration."

Officers were elected as follows: Honorary president, Allen Ripley Foote, Columbus, O.; re-elected president, Samuel T. Howe, Topeka, Kan.; vice-president, Professor Charles J. Bullock, Harvard University; treasurer, A. E. Holcomb, New York, re-elected, and secretary, Dr. T. S. Adams, Madison, Wis., re-elected. The place for holding the next convention will be named by the executive committee later.

Conference of Governors.

The eighth annual conference of Governors was held at Boston, Mass., Aug. 24-26. About thirty governors and ex-governors were present at the conference and many of them read papers or delivered addresses.

Governor Walsh in his address of welcome referred to the topic of the first day with the words:

"Of late it is becoming generally understood that the business efficiency indispensable for good government can only be secured by concentrating power and responsibility as the fathers planned. The general expectation is that the executive, the one responsible representative of the people, shall by all means press upon the Legislature the reforms which public opinion craves."

William Hodges Mann, ex-Governor of Virginia, started the argument for

greater executive responsibility with a paper on "The Governor's Initiative."

"At present," he said, "most legislative sessions transact nearly all their business in a rush in the last ten or twelve days. Not only would I allow the Governor to introduce bills into the Legislature; I would have him permitted to submit to the people at the next general election any measure which he had recommended and which had failed to pass the Legislature. That there is little likelihood of danger in stronger executive power at present is indicated by President Wilson's conservative but influential exercise of executive power, which enables him to walk the narrow and difficult path between the honor of the country on the one hand and its peace and happiness on the other."

Governor Robert L. Williams, of Oklahoma, speaking on "The Functions of the Executive in Relation to the Budget," strongly recommended the budget plan favored by the New York Constitutional Convention now in session.

"It is essential," he said, "that some plan of financing the State be adopted comparable to that of large business enterprises."

Governor Moses Alexander, of Idaho, began his appeal for the short ballot with the remark: "There must be responsibility somewhere. It is essential," he went on, "that the Executive have more power and more responsibility, and this could be checked by the proper exercise of the recall. If the tendency that has progressed in some States continues to be followed, the executive power will be entirely divided among boards and commissions that often work at cross purposes. The patriotism and education of the people can be depended on to give us good Executives. No office should be filled by popular vote that is not important enough to receive the attention of the voters, just as the initiative and referendum should be used only in those matters which are of sufficient interest and importance to deserve general attention."

Governor James F. Fielder declared that the people of New Jersey were absolutely satisfied with the short ballot and that the judiciary of that State would not enter a campaign if they had to run for election. He added that 90 per cent. of New Jersey cities that had tried the commission form of government had found it thoroughly satisfactory.

Jackson Highway Association.

A convention of the Jackson Highway Association will be held at Nashville, Tenn., September 23-24, at which will be considered the various proposed routes for this highway.

It is proposed to construct two branches of the highway north of Louisville, one to extend northwest to Chicago, the other to run northeast through Ohio to Buffalo, New York. The first-named route has practically

(Continued on page 378.)

PERSONALS

Professor Thomas Bliss Stillman, of national reputation as a chemical engineer, died of heart disease after an illness of three weeks at his home in Jersey City, August 10, in his sixty-fourth year. As the author of many books and pamphlets in technical and applied chemistry, and as a professor at Stevens Institute of Technology for many years, he became one of the most prominent men of his profession in this country. Professor Stillman was born in Plainfield, N. J. After attending Alfred University for a short time he entered Rutgers College, from which he was graduated in 1876 with the degree of M. Sc. Then he went abroad and studied in Germany, being graduated from the Fresenius Laboratory in Wiesbaden in 1877. On his return he attended Stevens Institute for several years, and in 1883 received the degree of Ph. D.

During his long career Professor Stillman held many important positions in New Jersey. In 1884 he was appointed State Inspector of Oils, in 1911 he was appointed city chemist of Jersey City and Bayonne, and held these offices until his death. Professor Stillman was also appointed an examiner in chemistry for the municipal civil service in this city in 1911, and was later appointed chemist to the Medical Milk Commission of Newark, N. J.

He was a member of many societies.

Brown, Alvah, of Grand Rapids, Mich., has been elected chairman of the committee in charge of the Wolverine Highway.

Buerger, Charles B., principal assistant engineer of the firm of George W. Fuller, consulting engineer, 170 Broadway, New York, has resigned to accept a position as consulting engineer with the Atlantic Refining Co., Philadelphia, Pa.

Knowles, Morris, consulting engineer, has acquired the engineering business formerly conducted from offices in Pittsburgh, Pa., and Canton, O., by L. E. Chapin, recently deceased. Mr. Knowles, who was previously associated with Mr. Chapin, will conduct the combined business from his office, 2541 Oliver Building, Pittsburgh, continuing to specialize in water works, water power, sewerage, sewage treatment and disposal, sanitary investigation, town planning, flood prevention and valuation work.

McMahon, John J., chief of the Erie Fire Department, died August 20 from injuries received two weeks ago in the Mill Creek flood. Chief McMahon, while attempting a rescue in the flood area, was swept away and for a time his name was listed with the dead. Several hours later he was found floating in a mass of wreckage and taken to a hospital. He was severely injured and a few days ago developed typhoid pneumonia. He had been chief of the Fire Department since 1893.

Palmer, Ray, formerly Commissioner of Gas and Electricity of Chicago, has resumed his consulting engineering practice, including reorganizations, rates and lighting and other public utility and industrial matters.

Shattuck, Roy L., former mayor of Brazil, Ind., died at his home at that place August 15, aged 44.

Wilkerson, Jake, has been appointed by the county road commissioners as road superintendent for Jefferson and Hamblen counties, Tennessee, at a salary of \$1,500 a year.

Williams, John N., has been appointed consulting engineer of the Jacksonville, Fla., good roads committee.

LITERATURE

PUBLICATIONS RECEIVED.

A Manual for Health Officers. By J. Scott MacNutt. 633 pp. John Wiley & Sons, Inc., New York. Price \$3.00 net. (To be reviewed later.)

Ornamental Post Lighting of City Streets. By F. D. Paine. 16 pp. Bulletin 13, Engineering Extension Department, Technical Science, Iowa State College, Ames, Ia.

BOOK REVIEWS.

MUNICIPAL FREEDOM.—By Oswald Ryan. Introduction by President A. Lawrence Lowell. (The American Book Series.) 220 p.p. Doubleday, Page & Co., Garden City, N. Y. Price, 60 cents net.

The purpose of the series of "American Books" is "to present a popular, authoritative discussion of typical American problems and movements." Mr. Ryan has fulfilled this purpose and has written simply and vigorously and understandingly of the problems of government that American municipalities are today facing and some solutions which they are developing. Commission government, the city manager, the initiative, referendum and recall, the short ballot, preferential voting, non-partisan elections and "home rule" are given a lucid and tempting exposition, and the volume should certainly be of help in continuing the popularizing of growing reforms. These phrases of progress are becoming a little frayed, perhaps, but Mr. Ryan's concrete illustrations and convincing intimacy freshen his themes. The volume is, of course, one which could hardly take up limitations and objections to the theses and the discussions, therefore, have not the depth of a bigger work.

While the book is popular and designedly so, we are not very certain whether officials or citizens are responsible for reforms and which know less about them. Therefore, any person who must discuss and perhaps campaign for these reforms should find many talking points and thinking points in this volume. And any one who must oppose them should also read this volume to discover the strength of his opponents—and perhaps lose heart.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

NEW ROAD MACHINES.

Austin Ripper and Western Grader.

THE AUSTIN ROAD RIPPER.

The Austin road-ripper is a massive scarifier attachment for use in road maintenance work and is designed to be attached to the Mammoth Senior or Junior graders after removing the regular mold board. This machine is, of course, entirely different from the Austin scarifier, which is a separate machine propelled by the Austin motor roller.

The ripper is intended for a variety of uses. It may be used for scarifying a new macadam road before rolling it, as otherwise rolling very often crushes the stone between the roller and the hard surface beneath and the bonding is imperfect. In the case of an old macadam or gravel road which has rutted but which is still hard, the economical method of repairing it is to root it up with a road-ripper and the old stone, together with some fresh stone, will reform the surface in good shape at about one-quarter of the cost. The ripper is claimed to have many advantages over the commonly-used spiked rear wheel of a road roller, which, it is held, requires frequent traverses and which punctures the road unevenly and crushes the stone. One traverse of the ripper will do the work of a number of trips with the spiking roller. The teeth, acting from below instead of down, as in the case of spikes, root up and separate the stones. When hauled by a traction engine of sufficient power, old, rutted and raveled stone or gravel roads can be torn up to the depth required at a rate of from one-half to two miles per day.

The ripper is made entirely of steel, and is 8 feet long, has six tines and weighs about 1,050 pounds. The tines are $2\frac{1}{4}$ inches square made from high grade, special tool steel and are held securely in tapered sockets by large cotter pins. When the ripper is in working position there is a space of 12 inches between the tines which are set at a rooting angle of 45 degrees. They are adjustable and can be set to scarify any depth from one to twelve inches. The tine holder has two sets of sockets so that it can be reversed to scarify either to the right or left. With all tines in place, six feet of roadway can be scarified at once. When set at the proper angle the forward tine does the initial

breaking, thus minimizing the power required to operate. The holder is so constructed that it acts as a mold board, throwing the material either to the right or to the left as desired, thus preventing clogging.

THE WESTERN NO. 10 GRADER.

The reason for the new Western No. 10 Grader is, it is claimed by the manufacturers, that it is guaranteed against breakage. It has been felt by the makers that road officials and manufacturers have become somewhat dissatisfied with existing graders, which frequently break down, due to the hauling of heavy machines by high-power traction engines. Some graders are for this reason protected by brake pins or safety devices, which relieve the machine when it is subjected to unusual strain by shearing off, causing in the process much inconvenience. In the new Western there is no brake pin or other safety device used—the rugged construction of the machine is relied upon for safety.

The Western No. 10 is a composite design in which, it is claimed, is embodied necessary and desirable features of other graders together with some new, important and exclusive improvements. Among the latter is the use of heavy Z bars on the main frame and of $\frac{3}{4}$ -inch rivets instead of bolts and nuts. The blade is not rigidly attached to the blade beams but it has a lateral adjustment of 22 inches in either direction. This adjustment is automatic and is controlled by the position of the stay chains. This brings the cutting point in a more direct line with the draft and relieves the machine of strain. The automatic side shift also places the blade in such a position that its entire length is utilized, giving the machine a capacity greater than a twelve-foot blade machine. An eighteen-inch extension is provided for each end of the blade. This is a special shape for cutting new or cleaning out old ditches, undermining embankments or filling in old ditches. With this attachment either the heel or the point of the blade can be extended four feet outside the wheels. The blade lifting mechanism is ingenious and powerful, consisting of a roller bearing chain used in connection with the

sprocket, rack and pinion. The blade is 10 feet long.

Other important features are: the direct draft; dust-proof hubs and concave tires on all wheels; rear axle, which is both pivotal and extensible; powerful offset hitch operated from the rear.

The machine weighs about 6,400 pounds and has an over-all length of 18 feet 3 inches (without tongue) and a height of frame over blade of 4 feet.

These two road machines, which are here illustrated, are made by the Austin-Western Road Machinery Co., Karpen Bldg., 910 South Michigan Ave., Chicago, Ill.

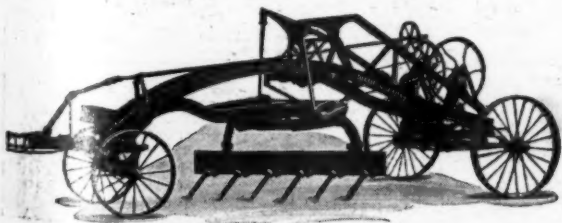
THE MANCHESTER STREET CLEANER.

A Pick-up Sweeper with a Collecting Dump Wagon.

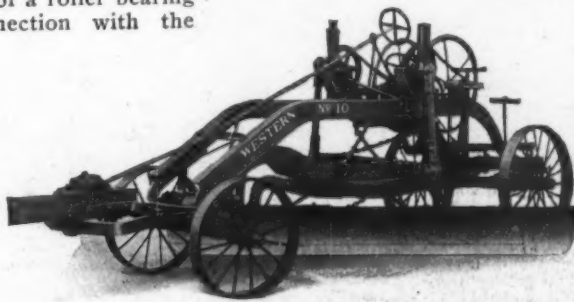
The Manchester street cleaning machine, which was described as the Finch street cleaning machine in our issue of December 10, 1914, has been recently improved and its effectiveness greatly increased. The construction of the machine is much strengthened. The method of holding the brush has been so changed that it has more flexibility and will more easily dig the dirt out of the low spots in the street surface.

The apparatus consists of two detachable units—the sweeper and the covered dump wagon—the whole designed to be drawn by two horses. The machine, it is claimed, will clean thoroughly a strip 8 feet wide at the rate of $2\frac{1}{2}$ miles an hour, or in a 10-hour day 5 miles of 40-foot street. The cost of this work will be less than \$2 a mile, figuring \$7 a day for team and two men and \$1 a day for gasoline.

The cleaner unit consists essentially of a brush, a gasoline engine to revolve it and an enclosed conveyor to transfer the sweepings. The engine is 15 h. p., water cooled, two cylinder, but as the machine never requires more than 7 or 8 h. p., the engine is not overworked. The power runs all the sweeping parts so that the sweeping is independent of the rate at which the team draws. From the engine the power is transmitted by Diamond roller chain drive which connects with a



AUSTIN ROAD RIPPER.



WESTERN NO. 10 GRADER.

sprocket on the rear axle of the truck. From this a second chain goes to the brush and the conveyor. The dirt is swept into a dust pan which extends the full length of the machine. A revolving spiral conveyor, located immediately above it, moves the dirt toward the center, where it is picked up by scrapers on an endless elevator chain driven by the sprocket wheel fastened to the center of the conveyor shaft. The dirt is carried up through the elevator pipe and dropped into the wagon.

The wagon is connected to the cleaner by a single pin which can be fastened or unfastened almost instantaneously. The dump box has a capacity of 3 cubic yards and is arranged in two compartments, with separate levers, so that, if desired, only one half the load can be dumped at a time—which makes the wagon convenient in case the dumping hole will hold only half a load.

The sweeping machine and dump wagon are built entirely of steel, making them very durable, and as there are no cast iron parts or unnecessary material, the complete outfit weighs only 1,800 pounds. Only one man, the driver, can run the machine if necessary, but two are recommended. There are turn-under front wheels on the steel trucks of the dump wagons and a single velocipede style turn-under front wheel on the cleaner. These make short turning—the entire outfit may be turned in twenty-five feet and the cleaner alone in fifteen.

Two of these Manchester sweeping machines were recently sold to the cities of Marshalltown, Ia., and Des Moines, Ia.

The accompanying illustration shows the complete outfit, which is made by the Manchester Machine Co., Manchester, Iowa.

The advantages of the cleaner and collector combination are obvious. The dirt is not first swept together and then left to be blown away again by the wind. The cleaning is done more thoroughly and the dirt carried away at once.

THE WHALEN FORM.

Unit Construction, for Standardized Concrete Culverts.

The Whalen culvert form is built up by the unit method with interchangeable parts. It is built in one size, but by expansion the complete form can build six different sized culverts, 15x24 inches, 24x27, 24x24, 24x30, 24x54 and 24x66, with either arched or semi-arched tops, and practically any inter-

head walls are made so they are either stood on end or on the long side. Slots are cut in the head walls so that the ears on the side sections project through. Four different positions are obtained in this way.

The Whalen form is of sheet steel, galvanized inside and out, and steel rods and is made to withstand hard usage. It has, of course, many advantages over wood forms where culverts



WHALEN CULVERT FORMS, TWINNED.

mediate size or style, from 15 inches to 5 or 6-foot span, with either arch, semi-arch or flat top. The principal claims made for the form are strength, greater capacity, low cost and use of least material.

The complete form consists of four sections with arch tops, and is 24 feet long in all, 24 inches wide and 27 inches high. It is equipped with two head walls, each 48x84 inches, one set of wing walls, one parapet box and six cover plates, each 2x3 feet. To build culverts wider than 24 inches, two sections are twinned and the cover plates are placed across the arch tops, producing a culvert with a semi-arch top. The form is simple and one man alone can set it up or take it down. The parapet box can now be adjusted to two different widths and two positions. The

have to be made in quantities. It is rustproof, watertight and gives a smooth monolithic structure.

The arch design, of course, allows a greater capacity of culvert than the round or rectangular design. The water level will also be lower in the case of the arch. So that with only a little more material required a much greater capacity is obtained with the Whalen design. By using the arch tops alone, culverts may be built having twice the carrying capacity of a 12-inch pipe with the same head room. A volume of water which would fill a 12-inch pipe would have a water level of about 4½ inches in the culvert thus made.

An advantage is claimed for the concrete culvert over the pipe culvert, in that the latter is caused to sag by the



THE MANCHESTER STREET SWEEPING MACHINE.

action of frost raising the ends, thus allowing the settling of sediment in the middle.

The illustrations show two sections twinned with cover plates across tops making a form 12 feet long, 60 inches wide and 27 inches high; also a culvert 48 inches wide and 27 high built by

culated to make it particularly well adapted to road work, the drum crushing all clods and making firm each successive cut as it comes from the grader. When the grade is built up, all parts of it have been rolled equally and it is firm but not packed solid as the tractor is of course lighter than a road roller. The lightness of the

diameter. The driving power is applied evenly to each end of the driver, which is a solid unit, and the special spring brackets on each end of the rear axle relieve strain in turning.

The frame is of structural steel, riveted and braced to stand loads at all angles. It is hung from the rear axle and not mounted above it. The draw-bar pin is convenient to the operator at



CULVERT BUILT WITH WHALEN FORM.



THE GRAY TRACTOR AT WORK.

using the cover plates lengthwise instead of crosswise.

The form is being widely and successfully used. It is in service in over 400 townships in New York state and especially large numbers have been sold in Illinois. Commissioner W. M. Biggs, Helena, Mont., has found that the forms will pay for themselves in the construction of about five culverts. In actual work he has found that it takes about two hours to set up the forms for a 66-inch culvert after the trenches are dug and 30 minutes to remove them. He built five culverts, 66 inches wide, with 3-foot clearance, including digging trenches and removing forms, and also hauling cement five miles and gravel one mile, for \$80. H. W. Schulty, county road commissioner, Ogemaw county, Mich., has found the forms a great saving.

The Whalen form is made by the Concrete Form Co., Inc., Syracuse, N. Y.

THE GRAY TRACTOR.

With Wide Drive Drum, for Road Work.

The special feature of the Gray tractor, the "wide drive drum" is cal-

Gray makes it possible to use it on roads where there are light bridges and culverts. If necessary, the drum can be weighted so as to make it serve as a roller.

The low, compact construction enables the Gray to work on side grades and at the ditching work that an ordinary four-wheel tractor would find difficult. Having no differential, side draft does not affect it and graders or road machinery may be hitched to the extreme corners of the tractor frame. The high speed is the ordinary working speed while the low speed is reserved for unusually difficult spots, cutting out the first heavy ditch cut or for taking steep grades.

The wide drive drum, together with the two front wheels, roll a strip 80 inches wide. The entire strip is rolled only once, the drum track coming within and just touching the wheel tracks. On the whole rolled strip there is less than 8,500 pounds of weight. Because of the wide drive drum but one drive wheel is used, thus eliminating differential gears and the consequent loss of power. This results in positive drive and traction at all times. The tractor can turn in a circle 22 feet in

all times and can be easily moved to suit conditions. Road building machinery may be very conveniently hitched to the harrowing arms.

The motor is 4-cylinder, 4-cycle, specially built for tractor service and heavy construction is replaced, as far as is consistent with strength, by lighter alloys. It has a Pickering fly ball governor, "K. W." high-tension magneto and special Bennett carburetor. The transmission gears are cut steel and mounted in shafts that run in Hyatt roller bearings. But six gears are used, all of the spur type. The chain is Diamond roller and the chain drive is spring mounted. The shafting is heat-treated chrome steel throughout.

The 1916 model Gray is built in two sizes. Model A develops 20 h.p. at draw-bar and 35 in belt. The drum is 5 feet high and 5 wide. The weight is 8,000 pounds. Model B weighs 5,500 pounds, develops 15 h.p. at draw-bar and 25 in belt and has a drum 4 feet wide and 4 feet 4 inches high.

The tractor, which is illustrated here, is made by the Gray Tractor Manufacturing Co., 1030 Marshall street, N. E., Minneapolis, Minn.



THE GRAY TRACTOR WITH THE WIDE DRIVE DRUM.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—Prices have been taken at Cleveland on 1,200 tons of pipe and at Minneapolis on 1,100 tons. The purchase of 200 tons at Wittenberg, Wis., is the only other municipal business of importance. Prices are strengthening in sympathy with recent advances in pig iron. Quotations: 4-inch, \$26; 6 to 12-inch, \$24; 16-inch and up, \$23.50; Class A, \$1 extra. Birmingham—The pipe makers have received additional fill-in orders to keep plants busy at the same good pace they have been making for some time, and prices have hardened at the advance. Quotations: 4-inch, \$21.50; 6-inch and up, \$19.50. New York—No public lettings of importance have appeared, but contractors are asking for prices on 25,000 feet of 6-inch and 6,000 feet of 8-inch for Westbury, L. I., and on 14,000 feet of 4-inch, 2,300 feet of 6-inch and 3,600 feet of 8-inch for Youngsville, Warren county, Pa. Quotations: 6-inch, Class B and heavier, \$23.50 and \$24; Class A, \$24.50 and \$25.

Lead.—Lead is firmer, with an irregular demand. Quotations: New York, \$4.50; St. Louis, \$4.35.

"Natural Asphalt" Production.—A recent advance bulletin of the U. S. Geological Survey states that the output of "natural asphalt" in 1914 amounted to 77,588 tons. The Geological Survey uses the term "natural asphalt" to include only gilsonite, elaterite, grahamite, bituminous limestone and bituminous sandstone. Consequently, the total of 77,588 tons of "natural asphalt" does not include the production of Trinidad and Bermudez.

The Sewell Cushion Wheel Company, Detroit, Mich., has opened a Buffalo office. This is the eighth general branch this company now have located throughout the country, the others being at New York, Chicago, Philadelphia, Boston, Cleveland, Seattle, and Los Angeles, and they are planning to open a St. Louis office very soon. Mr. A. W. Sewell, who formerly had charge of the fire apparatus department of the company, will act in the capacity of manager at Buffalo, and will be assisted by Mr. Geo. C. Seymour.

The Cleveland Builders' Supply Co., Cleveland, O., announces the appointment of W. T. Duggin as manager of the concrete road department.

The Blaw Steel Construction Co., Pittsburgh, Pa., has just issued a striking new folder on the Blaw system of steel forms for concrete construction of every type with photographs of Blaw forms used on New York subway construction, the Ashokan dam, Catskill aqueduct and other big jobs; the use of the Blaw forms for arches, tunnels, sewers, roads, columns and walls. The collapsible forms for sewer construction, and the traveling forms for walls, are especially interesting.

NEWS OF THE SOCIETIES

(Continued from page 374.)

been decided upon by the representatives from that section, while the route from Buffalo to Louisville remains to be selected at the coming meeting. The route from Louisville to Nashville has also been settled, but the remainder of the route from Nashville to New Orleans is likely to be determined at the Nashville convention in September.

There are four possible routes from Nashville south through Tennessee and citizens along these routes have already manifested intense interest in the highway project and the fight for the final routing between these sections promises to be warm.

The Tennessee routes are:

(1) Nashville to Franklin to Columbia to Pulaski to Athens, Ala.

(2) Nashville to Franklin to Columbia to Mt. Pleasant to Lawrenceburg to Florence, Ala.

(3) Nashville to Chapel Hill to Lewisburg to Pulaski to Decatur, Ala.

(4) Nashville to Shelbyville to Fayetteville to Huntsville, Ala.

Three things will be considered in connection with the claims put forward by the delegates in determining the final location of the proposed highway: direction of the route, population to be benefited by the highway, and the guarantee by the delegates that the road will not only be constructed but also maintained.

City Marshals' and Chiefs' of Police Union.

The twenty-first convention of the city marshals' and chiefs' of police union was held at Fort Worth, Tex., July 28-29. Houston was selected as the place for the next annual meeting and the following officers were elected: President, Ed. Whitley, Honey Grove; first vice-president, O. R. Montgomery, Fort Worth; second vice-president, John W. Ryan, Dallas; third vice-president, Ben F. Davison, Houston; sergeant-at-arms, Ed. Moeller, New Braunfels.

The following papers were read: R. L. Winfrey, Dallas, "The Police and the Press"; J. W. Ryan, Dallas, "How to Handle Dope Fiends"; Ben D. Davison, Houston, "Picture Shows and the Underworld"; Carroll Bates, San Angelo, "The Mexican Situation in Texas"; W. H. Perrett, Galveston, "Foreign Immigration"; Ed. Moeller, New Braunfels, "Auto Tourists"; Cullen Bailey, Fort Worth, "How to Handle Jitneys"; J. W. Morris, Austin, "Legislators"; F. H. Lancaster, San Antonio, "Tourists."

Fire Chiefs' Association of Maine.

The fifth annual convention of the Fire Chiefs' Association of Maine was held at Oldtown, August 5 and 6. The place and date of the next meeting was left to the executive committee. The following officers were elected: Assistant Chief William S. Mason of Bangor, president, re-elected; Chief

M. J. Moriarty of Lewiston, vice president; Ex-Chief Walter N. Hellenbrand of Oldtown, secretary; Chief C. W. Bowker of South Paris, treasurer. The board of directors is composed as follows: Chief W. W. Berry of Waterville; Chief Alexis Nadeau of Oldtown; Chief C. H. Bonser of Biddeford; Chief William S. Mills of Milford; Chief N. N. Kendall of Freeport; Chief G. W. Merrill of Auburn; Chief Fred M. Gates of Millinocket.

League of California Municipalities.

The eighth annual convention of the League of California Municipalities will be held at Oakland, September 7-10, in the new Municipal Auditorium.

Atlantic Deeper Waterways Association.

The eighth annual convention of the Atlantic Deeper Waterways Association will be held at Savannah, Ga., November 9-12, inclusive.

Wisconsin Paid Firemen's Association.

At the annual convention held at Marinette August 5, the following officers of the Wisconsin Paid Firemen's Association were elected: William Jacobs, Sheboygan, president; Joseph Kox, Neenah, vice president; Ole Norman, Superior, secretary; John Kratz, Manitowoc, treasurer; members of the executive committee are James G. Butler, Milwaukee; Charles F. Hennessey, Milwaukee; John H. Kratz, Manitowoc. The next annual convention will be held at Sheboygan.

Ohio State Firemen's Association.

The twelfth annual convention of the Ohio State Firemen's Association was held at Bellaire, August 3, 4 and 5. The convention was attended by about four hundred delegates and guests. The following officers were elected: President, S. P. Pond, De Graf; first vice-president, P. Morton, Columbus; second vice-president, William Webb, East Liverpool; third vice-president, James Felton, Bellaire; fourth vice-president, Joseph Wallace, Youngstown; secretary, D. K. Moser, Warren; treasurer, D. K. Knisely, New Philadelphia.

Massachusetts Permanent Firemen's Association.

At the annual meeting held at Lowell August 10, Taunton was selected as the place for the next meeting and the date set as August 8. It was voted to indorse the two-platoon bill if brought before the legislature. The following officers were elected: President, Burton Steere, Springfield; vice-presidents, William P. Reilly, Cambridge, A. Manning, Milton, and Frank P. Burns, Chicopee; secretary, Thomas J. Powers, Worcester; treasurer, Ernest A. Slattery, Fitchburg; directors, John J. Kelley of Lawrence, John T. Day of Lynn, Edward J. Barry of Brockton, James J. Crowley of Holyoke, George K. Stacy of Newton, Joseph F. Sanders of Somerville, William H. Hawkins of Haverhill, Thomas S. Pope of Salem and Thomas Burke of Fall River; sergeant-at-arms, Daniel J. Hanan of Peabody.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
N. D.	Binford	2 p.m., Sept.	4.. 2,745 cu. yds. grading.	A. M. Hemmerlin, Clk.
Ind.	Greencastle	2 p.m., Sept.	4.. Grading, paving and improving roads.	C. L. Alrhart, Co. Aud.
W. Va.	Wellsburg	noon, Sept.	4.. Paving road	K. C. Brashear, Clk. Co. Court.
Minn.	Duluth	11 a.m., Sept.	4.. Grading and graveling streets.	J. A. Farrell, St. Comr.
Ill.	Grayville	1 p.m., Sept.	4.. Constructing 6,828 ft. gravel road.	R. H. Frizzell, Twn. Clk.
Ind.	Lebanon	1 p.m., Sept.	5.. Constructing gravel road	E. M. Clark, Co. Aud.
Ind.	Newport	Sept.	6.. One mile of brick pavement; cost, \$24,150.	Roy Slater, Co. Aud.
Kan.	Atchison	5 p.m., Sept.	6.. Paving one block	V. L. King, City Clk.
Kan.	Junction City	Sept.	6.. One mile concrete road.	R. M. Moon, Clk. Co. Comm.
Ind.	Greensburg	7.30 p.m., Sept.	6.. Constructing curbs, gutters and sidewalks.	C. E. Patton, City Clk.
Ind.	Jeffersonville	10 a.m., Sept.	6.. Grading, draining and macadamizing road.	G. W. Stoner, Co. Aud.
Utah	Farmington	6 p.m., Sept.	6.. Constructing 25,000 sq. ft. cement concrete walks.	E. W. Weiling, City Rec.
Pa.	Marcus Hook	8 p.m., Sept.	6.. Constructing 7,000 yds. pavement and 800 sq. yds. concrete gutter	Chas. Upham, Engr.
N. C.	Walnut Cove	Sept.	6.. Constructing 3,000 yds. concrete sidewalks.	O. N. Petree, Mayor.
Miss.	Macon	Sept.	6.. Road improvements	J. A. Tyson, Chancery Clerk.
Miss.	Clarksboro	Sept.	6.. Two miles gravel road.	S. S. Carr, Chancery Clerk.
La.	Anamosa	10 a.m., Sept.	6.. 1,000 yds. crushed stone.	E. J. Hines, Co. Aud.
Wis.	Neeah	2 p.m., Sept.	6.. Constructing conc. curb & gutter & grading streets.	H. S. Zemlock, City Clk.
N. C.	Dobson	2 p.m., Sept.	6.. Constructing township road	J. N. Ambler, Hwy. Engr.
Ga.	Rome	Noon, Sept.	6.. Constructing 1 1/2 miles of road, cost \$1,800.	Kiener Lindsey, Co. Engr.
S. D.	Mitchell	8 p.m., Sept.	6.. Grading and graveling streets.	Thomas Eastacott, City Aud.
Ind.	Franklin	2 p.m., Sept.	6.. Grading, paving and improving roads, two jobs.	H. L. Knox, Co. Aud.
N. Y.	Albany	3 p.m., Sept.	7.. Grading, paving with asphalt and redressed granite block, and laying concrete walks and pipe sewers.	Isadore Wachsmann, Sec. Bd. Con. & Sup.
Ariz.	York	10 a.m., Sept.	7.. Constructing county road	A. L. Perry, Clk., Clifton.
Ind.	English	2 p.m., Sept.	7.. Grading, paving and improving roads.	J. B. Enlow, Co. Aud.
Minn.	St. Paul	10.30 a.m., Sept.	7.. Grading, improving and repaving streets.	Aug. Hohenstein, Pur. Agt.
Cal.	Oakland	Sept.	7.. Grading and paving with bitulithic on concrete base.	Geo. E. Gross, Clk. Bd. Supv.
Mass.	Boston	Noon, Sept.	7.. Laying artificial stone sidewalks & const. asphalt or bitulithic pavement	E. F. Murphy, Comr. P. W.
W. Va.	Charleston	Noon, Sept.	7.. Laying 34,000 yds. pavement.	E. A. Wise, City Mgr.
Wis.	N. Milwaukee	8 p.m., Sept.	7.. 4,500 sq. ft. concrete sidewalks.	A. F. Schwan, Vil. Clk.
Minn.	Tracy	8 p.m., Sept.	7.. 1,634 cu. yds. gravel; 6,300 ft. curbing.	C. M. Campbell, City Rec.
Ohio	Columbus	noon, Sept.	7.. Paving	G. A. Borden, Dir. Pub. Ser.
Mont.	Hamilton	10 a.m., Sept.	7.. One and one-half miles road.	Co. Clerk.
Ky.	Nicholasville	noon, Sept.	7.. One and one-half miles turnpike.	C. S. Woodward, Co. Engr
N. J.	Newark	2 p.m., Sept.	7.. Street improvements	F. A. Reimer, Co. Engr.
Ohio	Cincinnati	noon, Sept.	7.. Granite curbing, asphalt paving and improving.	Chf. Engr. Dept. Pub. Ser.
Ky.	Louisville	2 p.m., Sept.	7.. Paving with vitrified brick.	Bd. Pub. Wks.
N. J.	Englewood	Noon, Sept.	7.. Improving streets.	Bd. Chosen Freeholders.
N. J.	Union	8 p.m., Sept.	7.. Improving and repaving streets	Emil Bautz, Town Clk., Weehawken.
Fla.	West Palm Beach	Sept.	7.. Constructing hard surface road	F. E. Encell, Chr. Co. Comra.
Fla.	Tampa	Sept.	7.. 100,000 sq. yds. brick, asphalt block, asphaltic concrete and concrete paving	Ralph Martin, City Engr.
Ind.	Brazil	7.30 p.m., Sept.	7.. Constructing concrete sidewalks.	F. K. DeArme, City Clk.
N. Y.	Dunkirk	8 p.m., Sept.	7.. Regulating, grading and paving streets.	A. D. Toomey, City Clk.
S. D.	Chamberlain	10 a.m., Sept.	7.. Grading and crowning several roads.	John F. Maack, Co. Aud.
N. D.	Washburn	2 p.m., Sept.	7.. Grading road	E. C. Stocker, Co. Aud.
N. J.	Westfield	8 p.m., Sept.	7.. 9,910 yds. macadam, 2,700 ft. curb, 9,100 yds. excavation.	Charles Clark, Town Clk.
Mo.	St. Louis	Noon, Sept.	7.. Paving with wood block, vitrified brick and asphalt, and laying granite curb.	E. R. Kinsey, Pres. B. P. S.
Ind.	South Bend	10 a.m., Sept.	7.. Grading, curbing and paving with gravel.	Veronica Sweeney, Clk. Bd.
Ind.	Noblesville	10 a.m., Sept.	7.. Grading, draining and paving with gravel.	W. O. Horton, Auditor
Ind.	Knox	Noon, Sept.	7.. Grading, draining and paving road.	C. W. Weninger, Co. Aud.
Ind.	Washington	2 p.m., Sept.	7.. Constructing and improving roads, four jobs.	L. S. Core, Co. Aud.
Ind.	Rensselaer	2 p.m., Sept.	7.. Highway improvements	J. P. Hammond, Co. Aud.
Ind.	Warsaw	2 p.m., Sept.	7.. Constructing macadam road.	Victor D. Mock, Co. Aud.
Ind.	Brazil	10.30 a.m., Sept.	7.. Constructing two gravel roads and one stone road.	W. O. Graesser, Co. Aud.
Ind.	Winamac	Sept.	7.. Constructing two miles gravel road, cost \$9,721.	C. E. Paul, Co. Surv.
Md.	Princess Anne	Sept.	7.. Constructing 2.01 miles state aid highways.	John Holland, Clerk.
O.	Shaker Heights	noon, Sept.	7.. Grading, draining, curbing and paving with brick, concrete, asphalt or bituminous macadam	E. A. Palmer, Vil. Clk., Cleveland, P. O.
Ala.	Linden	Sept.	7.. Constructing 40 miles sand-clay and gravel roads.	F. W. Gaines, Jr., Selma.
Ind.	Bloomington	2 p.m., Sept.	7.. Road construction	W. S. Kinsey, Co. Aud.
Ind.	Vincennes	2 p.m., Sept.	7.. Constructing gravel road in three townships.	County Auditor.
Ind.	Monticello	10 a.m., Sept.	7.. Improving roads	J. E. Fisher, Co. Aud.
Ind.	Mt. Vernon	2 p.m., Sept.	7.. Two gravel roads	J. R. Haines, Co. Aud.
Ind.	Crawfordsville	10 a.m., Sept.	7.. Ten-ton steam roller and scarifier.	B. B. Engel, Co. Aud.
Ind.	Sullivan	Noon, Sept.	7.. 2 1/2 miles gravel road.	W. S. Bicknell, Co. Aud.
O.	Cleveland	Noon, Sept.	7.. Paving with brick, concrete or bituminous materials.	Village Clk., Shaker Hgts.
La.	Lake Charles	11 a.m., Sept.	7.. 13 1/4 miles gravel and shell highway.	Fred Shutz, Parish Engr.
La.	Caldwell	Noon, Sept.	7.. Graveling five miles of earth highways.	W. E. Atkinson, State Hwy. Engr., New Orleans.
O.	Oak Harbor	Sept.	7.. 2,000 sq. yds. brick or asphaltic concrete paving.	L. L. Carstensen, Vil. Clk.
Ind.	Elphinstown	Noon, Sept.	7.. Grading, paving and improving road.	M. G. Haun, Co. Aud.
N. D.	Ellendale	2 p.m., Sept.	7.. Constructing two grades	C. C. Misfeldt, Co. Aud.
N. J.	Hackensack	Sept.	7.. Grading, guttering and paving with hillside brick and asphalt concrete	V. Morrison, Chr. Co. Rd. Com.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind., Shelbyville.....	10 a.m., Sept.	8..	Grading, draining & paving with gravel 11,666 ft.; 11,800 ft. grading & paving; 9,962 ft. grading & graveling....	F. W. Fagel, Co. Aud.
Ia., Des Moines.....	10 a.m., Sept.	8..	Grading grounds and streets at State Capitol.....	A. J. Davidson, Sec. Ex. Council.
Kan., Olathe	Noon, Sept.	8..	Grading $\frac{3}{4}$ mile street	W. J. Moore, Clk. Co. Comrs.
O., Lorain	Noon, Sept.	8..	Paving streets with brick or asphalt, includes 15,700 yds. paving, 5,300 ft. curb and 6,000 cu. yds. excavation....	C. M. Osborne, City Engr.
La., Red River.....	Noon, Sept.	8..	Improving 8.1 miles earth highways.....	W. E. Atkinson, State Hwy. Engr., New Orleans.
N. J., Newark	noon, Sept.	8..	Surface treating 10.53 miles of road with Tarvia B and screenings	J. W. Hursey, Co. Aud.
N. Y., New York.....	10.30 a.m., Sept.	8..	Grading, curbing, laying sidewalks and constructing bituminous concrete pavement.....	D. Mathewson, Pres. Bronx Co. Commissioners.
O., Newark	Noon, Sept.	8..	Constructing two sections of road.....	W. K. Roy, State High. Com.
Wash., Olympia.....	2 p.m., Sept.	8..	Surfacing three miles highway.....	F. E. Robbins, Clk. Co. Bd.
Mont., Hamilton.....	3 p.m., Sept.	8..	Grading $\frac{1}{2}$ miles of road, 6,000 yds. excavation.....	F. E. Robbins, Clk. Co. Bd.
Mont., Hamilton.....	3.30 p.m., Sept.	8..	Constructing $\frac{1}{4}$ miles of road.....	L. F. Pilcher, State Architect, Albany.
N. Y., Farmingdale	Sept.	8..	Constructing concrete walks at agricultural school.....	A. B. Pilch, Co. Clerk.
Cal., Riverside	Sept.	8..	Grading and paving with concrete.....	L. B. Johnston, Clk. Pub. Serv.
O., Lorain	Noon, Sept.	8..	Draining, curbing and paving with vit. brick, two jobs..	F. L. Ellenberger, Clk., Elyria.
O., La Grange.....	1 p.m., Sept.	8..	Resurfacing 10,911 ft. with bituminous bound slag macadam	Geo. Baxter, Co. Aud.
Ind., Lafayette	Sept.	8..	Constructing 12 gravel roads	P. H. Landen, City Engr.
Ill., Alton	Sept.	8..	16,350 yds. vit. brick pavement and 4,467 cu. yds. excavation, cost \$33,866.....	W. C. Miller, Co. Aud.
Ind., Rochester	2 p.m., Sept.	9..	Grading, paving and improving roads.....	H. M. Cribbs, Co. Controller.
Pa., Pittsburgh	Sept.	9..	7.2 miles brick and macadam road construction.....	E. Simons, Co. Aud.
Ind., Crown Point.....	1 p.m., Sept.	9..	Constructing gravel road.....	M. I. Fagen, City Clk.
N. J., Jersey City.....	11 a.m., Sept.	9..	Repaving two streets	A. H. Williams, City Clk.
Fla., Tallahassee.....	4 p.m., Sept.	9..	Paving, curbing, grading & draining several streets....	City Clerk
N. Y., Lockport	Sept.	9..	2,000 yds. brick paving.....	County Auditor.
Ind., La Porte.....	10 a.m., Sept.	9..	Road construction	P. C. Given, Clk. Pub. Serv.
O., Wooster	Noon, Sept.	10..	Paving with vitrified brick.....	Chas. Wenister, Co. Aud.
Ind., Knox	Noon, Sept.	10..	Road construction	Co. Commissioners.
Wash., Tacoma	Sept.	10..	Grading and paving with asphalt, Warrenite, bitulithic, bitucrete and bituminous macadam	C. Cowen, St. High. Comsr.
Ohio, Columbus.....	Sept.	10..	Several state highway contracts.....	City Clerk
W. Va., Wheeling.....	Sept.	10..	Resurfacing streets and roads.....	E. R. Kinsey, Pres. Bd. P. S.
Mo., St. Louis	noon, Sept.	10..	Improving streets by paving with asphalt and brick....	Bd. Pub. Serv.
O., Wooster	Sept.	10..	Grading, curbing and paving with brick.....	J. L. Hjelmstad, Twn. Clk.
N. D., Holmes.....	2 p.m., Sept.	10..	Road construction	A. M. Cawley, Boro Engr.
Pa., Bethlehem.....	noon, Sept.	11..	45,000 sq. yds. 3-inch amiesite on concrete.....	W. O. Horton, Co. Aud.
Ind., Noblesville	10 a.m., Sept.	11..	Grading, paving and improving road.....	H. J. Lelande, Clerk Supv.
Cal., Los Angeles	Sept.	13..	Improving roads	J. L. Bauer, Co. Engr.
N. J., Elizabeth.....	2.30 p.m., Sept.	13..	Widening concrete pavement, about 5,418 yds. macadam or Amiesite; 13,720 yds. macadam or Amiesite.....	Harry Trippett, Town Clk.
N. J., Montclair.....	8 p.m., Sept.	13..	Constructing 17,000 ft. concrete curb.....	J. L. Bauer, Co. Engr.
N. J., Elizabeth	2.30 p.m., Sept.	13..	Constructing four miles Amiesite road and making 3,200 yds. excavation	Benj. Paepke, City Clk.
Wis., Columbus	3 p.m., Sept.	14..	Laying 7,180 yds. bituminous and 1,170 yds. concrete pavement and making 2,750 cu. yds. excavation....	H. C. Fox, Clk., Pub. Serv.
O., Youngstown	Noon, Sept.	14..	Grading road	W. H. Scott, Co. Aud.
Ind., Columbus	2 p.m., Sept.	14..	Grading, draining and graveling roads.....	James Wilson, State Hwy. Comr.
Del., Wilmington.....	Noon, Sept.	14..	Constructing and improving two miles of road.....	W. H. Dierken, City Clk.
Wis., Reedsburg	7.30 p.m., Sept.	14..	Paving with brick	County Auditor.
Ind., Columbus	2 p.m., Sept.	14..	Constructing of county line road.....	F. W. Fagel, Co. Aud.
Ind., Shelbyville.....	2 p.m., Sept.	14..	Grading, draining and graveling highways.....	R. J. Cunningham, State Hwy. Comr.
Pa., Harrisburg.....	10 a.m., Sept.	15..	Const. 34,996 ft. bitu. or conc. pavement, 16 ft. wide....	K. A. Scheid, City Recorder
Utah, Salt Lake City.....	10 a.m., Sept.	15..	Paving with bituminous concrete	C. J. Sanzenbacher, Co. Aud.
O., Toledo	10 a.m., Sept.	17..	Grading, draining and macadamizing road.....	G. T. Haynes, City Clk.
Fla., De Land	Sept.	18..	Constructing cement sidewalks.....	A. J. Klingenschmidt, Co. Clk.
Kan., Ellsworth.....	Sept.	18..	Constructing eight miles of road.....	W. D. Lyon, Bluff City.
Tenn., Knoxville	2 p.m., Sept.	20..	Grading, draining and macadamizing road, cost \$90,000..	C. M. Dulaney, Engr.
Tenn., Blountville	Sept.	20..	Grading, draining and macadamizing.....	C. A. Reimer, City Engr.
N. J., Newark.....	2 p.m., Sept.	20..	Street improvements	S. W. Mahaffey, Dir. P. S.
O., Conneaut.....	Noon, Sept.	20..	14,400 yds. asph. or brick pavement, 12,000 ft. conc. curb, and 2,550 ft. storm sewer.....	Al. P. Erickson, Co. Clk.
Minn., Minneapolis	11 a.m., Sept.	20..	10,000 yds. filling or grading.....	H. Waldorf, Rd. Engr.
Md., Denton	noon, Sept.	21..	2.06 miles state aid highway with shell macadam or concrete	W. H. Anderson, Clk. Co. Comrs.
Md., Denton	Noon, Sept.	21..	Building 2.06 miles shell macadam and concrete highway..	Co. Commissioners.
Ala., Carrollton	Sept.	22..	Grading, draining and surfacing with sand-clay or gravel	S. B. Weeks, Town Clk.
Iowa, Guthrie Center	Sept.	30..	30 miles paving with sheet asphalt, asphaltic concrete, bitulithic, vitrified brick or concrete.....	
SEWERAGE				
La., Hammond	Sept.	4..	Constructing sewer system	X. A. Kramer, Engr., Magnolia, Miss.
N. D., Grand Forks.....	Noon, Sept.	4..	380 ft. 15-in. pipe sewer.....	W. H. Alexander, City Aud.
Wyo., Thermopolis	2 p.m., Sept.	6..	Constructing sewer system.....	A. J. Lowry, Clk.
Wis., Independence	8 p.m., Sept.	6..	1,260 ft. 12-in., 750 ft. 10-in. sewer pipe, manholes, etc., and 445 ft. 6-in. c-i. water pipe.....	Jacob Jackson, Vil. Clk.
W. Va., Huntington	Sept.	6..	Constructing several sewers	O. H. Wells, City Engr.
Ia., Primghar.....	Sept.	6..	Constructing sewer system.....	Village Clerk
Mich., East Grand Rapids.....	Sept.	6..	Reinforced concrete disposal plant, cost \$8,000.....	H. Hugenholz, Vil. Clk.
Cal., Huntington Beach	Sept.	7..	Constructing sewers in several streets.....	City Clerk
Minn., St. Paul	10.30 a.m., Sept.	7..	Constructing sewers	Aug. Hohenstein Pur. Agt.
S. D., DeSmet.....	1 p.m., Sept.	7..	Drainage ditch construction.....	L. I. Olson, Co. Aud.
Pa., Pottsville.....	7.30 p.m., Sept.	7..	Constructing 1,305 ft. 12-in. sewer.....	W. S. Pugh, City Engr.
N. Y., New Brighton.....	Noon, Sept.	7..	Constructing sewage disposal plant at county jail.....	C. D. Van Name, Boro. Pres.
N. J., Westfield	8 p.m., Sept.	7..	Laying 2,300 ft. 8 and 12-in. sanitary sewers.....	A. W. Vars, Twn. Engr.
O., Cleveland.....	Noon, Sept.	7..	Constructing sewers	C. A. Palmer, 2855 Coventry Rd.
O., Cleveland Heights.....	Sept.	7..	Constructing storm and sanitary sewers	H. H. Canfield, Warrensville.
N. Y., Albany.....	3 p.m., Sept.	7..	Construction of sewage pumping stations.....	Isadore Wachsmann, Sec. B. C. & S.
N. J., South Orange.....	8 p.m., Sept.	7..	Constructing sanitary sewers, including 12,500 ft. 4 to 12-in. pipe	Edward Arcularius, Clk.
Ky., Henderson	2 p.m., Sept.	7..	Ditch excavation	O. A. Benton, Sec. Dr. Com.
Ia., Glenwood	1.30 p.m., Sept.	7..	Cleaning ditch and repairing levee.....	R. E. Humphrey, Co. Aud.
Wash., Pullman.....	Sept.	7..	Constructing sanitary sewer, probable cost \$12,000.....	L. V. Edwards, City Engr.
N. D., Fargo.....	10 a.m., Sept.	8..	Constructing 12-in. lateral sewer.....	A. R. Watkins, City Aud.
Colo., Denver.....	2 p.m., Sept.	8..	10 miles drainage canal, 1,206,000 yds. excavation....	U. S. Reclamation Service.
				A. P. Davis, Ch. Engr.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
O., Cleveland	Noon, Sept.	8..1,000 ft. pipe outlet drain at sewage treatment works.	A. R. Callow, Comr. Pur. & Sup.
N. Y., Brooklyn	11 a.m., Sept.	8..Repairing sewers and constructing sewer basin.	L. H. Pounds, Boro. Pres.
O., Cleveland	Noon, Sept.	9..Constructing sewers in several streets.	A. R. Callow, Comr. Pur. & Sup.
N. Y., New York	2 p.m., Sept.	9..Sewer construct., including 566 ft. 15 & 20-in. tile sewer.	M. M. Marks, Boro. Pres.
Fla., Tallahassee	Sept.	9..Paving, curbing and constructing storm sewers.	A. H. Williams, City Clk.
Mich., Dowagiac	10 a.m., Sept.	10..Constructing drainage ditch.	A. M. Moon, Co. Drain Comr.
Minn., Bemidji	10 a.m., Sept.	13..165 miles drainage ditch, cost \$244,142.	J. L. George, Co. Aud.
Minn., Bemidji	2 p.m., Sept.	13..27 miles drainage ditch, cost \$48,000.	J. L. George, Co. Aud.
Minn., Bemidji	3 p.m., Sept.	13..Four miles drainage ditch, cost \$7,174.	J. L. George, Co. Aud.
Minn., Windom	1 p.m., Sept.	13..Constructing drainage ditch.	P. G. Neufeld, Clk. Dis. Court.
Wash., Roslyn	Sept.	13..Sewer improvements in four districts.	G. T. Wake, City Clerk.
Pa., Eddystone	8 p.m., Sept.	13..Constructing 8-in. terra cotta sewer.	J. A. Campbell, Council Clk.
Minn., St. Paul	Sept.	13..Constructing sewer system with pipe 9 ins. to 6 ft. in diameter, estimated cost \$145,000.	Aug. Hohenstein, Pur. Agt.
Mo., St. Louis	Noon, Sept.	14..Constructing 28,000 ft. 6 to 57-in. tile, vitrified clay, brick and segment block sewers.	E. R. Kinsey, Pres. B. P. S.
Minn., Virginia	8 p.m., Sept.	14..Constructing sanitary sewer.	A. E. Bickford, City Clk.
Neb., Wayne	8 p.m., Sept.	14..Constructing sanitary sewers.	J. M. Cherry, City Clk.
La., Clinton	8 p.m., Sept.	14..Constructing sanitary and storm sewers.	F. W. Leedham, City Clk.
Fla., Ocala	Sept.	14..Sewer system, including 120,000 ft. of 6 to 18-in. sewer, 237 manholes, 51 automatic flush tanks and sewage disposal system.	H. C. Sistrunk, City Clk.
Mont., Malta	Sept.	15..Reservoir and drainage canal.	U. S. Reclamation Service
Cal., Santa Barbara	Sept.	16..42,500 ft. 6 to 12-in. vit. sewer, cost \$21,000.	A. B. Cook, City Engr.
Minn., R. Lake Falls	10 a.m., Sept.	17..Const. drainage ditches, canals and culverts.	Geo. DuPont, Co. Aud.
Mont., Whitehall	10 a.m., Sept.	18..Sewerage system.	G. E. Baker, Cons. Engr.
Minn., Brainerd	Sept.	20..Constructing lateral sewers.	A. Mahlum, City Clerk.
O., Port Clinton	Sept.	20..2,000 ft. 22-in. sewer.	City Clerk.
Minn., Brainerd	8 p.m., Sept.	20..Constructing lateral sewer.	A. Mahlum, City Clk.

WATER SUPPLY

La., Humboldt	.....	6 p.m., Sept.	6..Motor and pumps for plant.	J. A. Parker, Town Clk.
N. S. W., Sidney	.....	Sept.	6..Delivering and erecting pumping station.	Metropolitan Board Water Supply & Sewerage.
Sask., Regina	.....	Sept.	6..Constructing 7 million gallon pumping unit.	J. W. Mackay, Supt. W. W.
Ill., Mounds	.....	Sept.	6..Laying water pipe.	Thomas Lackey, City Clk.
Kan., Simpson	.....	Sept.	7..Constructing waterworks to cost \$12,000.	S. C. Loop, City Clk.
Wis., Oshkosh	.....	2 p.m., Sept.	7..Laying 3,800 ft. wrought iron (2-in.) water pipe.	R. A. Hollister, Chr. B. P. W.
O., Cleveland Heights	.....	noon, Sept.	7..Constructing 8-in. water main.	F. A. Pease Engrg Co., Cleveland.
Ill., Monticello	.....	7 p.m., Sept.	7..Furn. & installing deep well & service pump.	City Clerk
Cal., Vallejo	.....	Sept.	7..Cast-iron pipe and fittings for Mare Island Navy Yard.	Bureau of Supplies & Assets, Washington
O., Cleveland	.....	Noon, Sept.	7..Constructing water mains.	C. A. Palmer, 2855 Coventry Rd.
O., Warrensville	.....	Noon, Sept.	7..Constructing water mains.	H. H. Canfield, Vil. Clk.
Mont., Billings	.....	Sept.	7..300 ft. 20-in. c.l. pipe, 3 tons castings and 1,500 lbs. lead.	E. S. Judd, City Clk.
Mass., Boston	.....	Noon, Sept.	9..11,500 ft. 10 and 12-in. water pipe.	E. F. Murphy, Comr. P. W.
O., Oberlin	.....	Sept.	10..Constructing 10,000,000-gallon reservoir.	W. F. Schlickler, City Engr.
Neb., Hastings	.....	Sept.	13..Sinking 24-in. well 130 ft.	Light & Water Commission
Ohio, Belleville	.....	noon, Sept.	14..Waterworks, including deep well pump, natural gas engine, distribution system, storage reservoir, etc.	C. L. Shaffer, Vil. Clk.
N. Y., Manchester	.....	Sept.	15..Constructing water works system.	Board of Village Trustees
O., Medina	.....	Sept.	15..12,336 ft. of 4-in. pipe, 15 hydrants, 37 valves and 6,800 lbs. special castings.	B. E. Elkard, Clk. B. F. A.
Mont., Whitehall	.....	Sept.	18..Waterworks system.	G. E. Baker, Cons. Engr.
Utah, Myton	.....	Sept.	20..Constructing water works.	R. B. Croix, Town Clerk

LIGHTING AND POWER

Minn., Virginia	.....	8 p.m., Sept.	6..1,000 to 1,500 kw. turbine, electrical apparatus, etc.	Max Lewis, Sec. W. & L. Com.
Fla., Jacksonville	.....	Sept.	6..1,000 watt meters and transformers.	R. M. Ellis, City Pur. Agt.
Wyo., Baggs	.....	6 p.m., Sept.	7..Oil engine, generator & elec. equip. for wtr. wks. impts.	G. A. Deaton, Town Clk.
Pa., South Bethlehem	.....	8 p.m., Sept.	7..Street lighting with arcs and incandescents; furnishing current for street lighting; lighting portions of certain streets with lights on iron standards.	W. H. Seiple, Chr. Lamp Com.
Mont., Anaconda	.....	Sept.	8..Movable crest and operating mach. for Vandalla Dam.	U. S. Reclamation Service, Washington, D. C.
O., Cleveland	.....	Noon, Sept.	8..Lighting fixtures for new city hall; superstructure for boiler house at Correction Farm.	A. R. Callow, Comr. Pur. & Sup.
Minn., Hallock	.....	2 p.m., Sept.	9..Constructing electric light plant.	City Clerk
O., Columbus	.....	2 p.m., Sept.	10..Installing two 400-h.p. water tube boilers and two 400-h.p. stokers.	A. F. Shepherd, Oak & Ninth Sts.
N. J., Perth Amboy	.....	8 p.m., Sept.	11..170 25-c.p. and 7 80-c.p. lamps.	Street Lighting Comrs.
D. C., Washington	.....	Sept.	13..Motor-driven capstans, switchboards, cables and miscellaneous equipment.	Purchasing Agent, 24 State St., New York.
Neb., Leigh	.....	Sept.	13..Electric light plant.	E. M. Nelson, City Clk.
Pa., Williamsport	.....	Sept.	17..Electric lights for ten years.	J. A. L. Minor, Supt. St. & P. I.
Okla., Adamson	.....	Sept.	20..Electric light plant.	Frank Mann, Engr.
Kan., Parker	.....	Sept.	20..Electric light plant.	O. C. Conrad, City Clk.
N. C., Hickory	.....	Oct.	12..Lighting streets and operating electric plant.	S. C. Cornwell, City Mgr.
D. C., Washington	.....	10 a.m., Nov.	17..Central light and power plant.	Supervising Architect.

FIRE EQUIPMENT

Mont., Big Timber	.....	5 p.m., Sept.	6..Two-ton motor fire truck.	J. F. Rees, City Clk.
Pa., Apollo	.....	8 p.m., Sept.	6..Constructing hose house.	S. G. McNees, Sec. Boro. Council.
N. J., N. Brunswick	.....	10 a.m., Sept.	7..Combination police patrol and ambulance.	E. J. Houghton, Dir. P. S.
Pa., New Kensington	.....	8 p.m., Sept.	7..Three-ton motor fire truck.	W. N. Jenkins, Sec. of Boro.
N. Y., New York	.....	10.30 a.m., Sept.	7..Four motor driven fuel wagons for fire department.	W. H. Weeks, Dep. & Act. Fire Comr.
Cal., Glendora	.....	Sept.	7..Motor combination chemical and hose.	K. M. Suydam, City Clk.
Mass., Boston	.....	Noon, Sept.	7..Three vertical tube boilers in fire dept. repair shop.	John Grady, Fire Comr.
Kan., Columbus	.....	Sept.	16..1½-ton motor truck.	P. R. Sayer, Chr. Fire Com.
Kan., Columbus	.....	Sept.	16..Combination hose and chemical.	F. H. Hawkins, City Clk.

BRIDGES

Ind., Shelbyville	.....	11 a.m., Sept.	4..Repairing, painting and flooring bridges.	F. W. Fagel, Co. Aud.
N. S., Halifax	.....	Noon, Sept.	4..Constructing 171 culverts.	Road Commissioner.
Conn., Bridgeport	.....	Noon, Sept.	4..Constructing Stratford bridge and approaches.	Bridge Commission.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRY
Neb., St. Paul.....	Noon, Sept.	5..	High truss steel bridge of five 145-ft. spans.....	J. D. Bahensky, Co. Clk.
Ia., Orange City.....	2 p.m., Sept.	6..	Constructing state line bridge over Sioux River.....	County Auditor.
Ga., Springfield.....	2 p.m., Sept.	6..	Constructing steel bridge; estimated cost, \$4,500.....	W. H. Cone, Ordway.
Ga., Statesboro.....	Sept.	6..	Bridge construction.....	County Commissioners
O., Hillsboro.....	Sept.	6..	Steel bridge over Rocky Fork.....	County Auditor.
Miss., Columbus.....	Sept.	6..	40, 80 and 100-foot span steel bridges and 50-foot span concrete arch.....	Gus E. Hauser, Engineer.
Miss., Clarksdale.....	Sept.	6..	Bridge repairs.....	S. S. Carr, Chancery Clk.
Minn., Inter. Falls.....	10 a.m., Sept.	6..	Steel bridge; two timber bridges.....	L. H. Slocum, Co. Aud.
Wyo., Worland.....	Sept.	6..	Constructing 60-foot bridge.....	E. M. Conant, Co. Clerk.
Miss., Senatobia.....	2 p.m., Sept.	6..	Constructing several bridges.....	J. A. Wooten, Chancery Clk.
Okla., Pawnee.....	6 p.m., Sept.	6..	Constructing three bridges.....	Allan Daniels, Clk. Co. Comrs.
Okla., Atoka.....	Sept.	6..	Constructing four wooden bridges and one steel bridge.....	Geo. Marlow, Co. Clk.
S. D., Canton.....	Sept.	7..	120-foot steel bridge.....	County Auditor
N. J., Elizabeth.....	3.30 p.m., Sept.	7..	Constructing two bridges.....	J. L. Bauer, Co. Engr.
Minn., Faribault.....	9 a.m., Sept.	7..	Removing old bridge & erect steel conc. bridge.....	E. F. Kelly, Recorder
Ky., Nicholasville.....	noon, Sept.	7..	Steel and concrete bridge.....	C. S. Woodward, Co., Rd. Eng.
Kan., Great Bend.....	noon, Sept.	7..	Reinforced concrete bridge 400 ft. long.....	C. S. Younken, Clk. Co. Comrs.
Mo., Perryville.....	Sept.	7..	Constructing steel bridge.....	T. J. Killian, Rd. & Bridge Comr.
N. Y., Olean.....	5 p.m., Sept.	7..	Steel or concrete bridge, about 400 ft. long.....	A. G. Harvey, Supt. Sts.
Ind., Covington.....	2 p.m., Sept.	7..	Constructing two bridges.....	H. W. Newlin, Co. Aud.
Ind., Brazil.....	10.30 a.m., Sept.	7..	Repairs to seven bridges.....	County Auditor.
O., Zanesville.....	11 a.m., Sept.	7..	47-foot steel bridge.....	S. C. Werner, Clk. Co. Comrs.
Wyo., Rawlins.....	10 a.m., Sept.	7..	Earth approaches to Sam Johnson bridge.....	L. B. Magor, Clk. Co. Comrs.
Ind., Brownstown.....	Sept.	7..	Constructing several bridges.....	Albert Leudtke, Co. Aud.
Neb., Harrison.....	1 p.m., Sept.	7..	100-foot standard steel bridge.....	C. O. Wertz, Clk. Co. Comrs.
Kan., Ellenwood.....	Noon, Sept.	7..	400-foot reinforced concrete bridge over Arkansas River.....	C. F. Younkin, Co. Clk., Great Bend.
S. D., Hudson.....	Sept.	7..	120-foot steel bridge.....	D. H. Wissink, Co. Aud., Canton.
Minn., Brainerd.....	2 p.m., Sept.	7..	Two steel and concrete bridges.....	C. W. Mahlum, Co. Aud.
Minn., Carlton.....	10 a.m., Sept.	7..	Constructing two highway bridges.....	A. R. Norman, Co. Aud.
Utah, Salt Lake City.....	10 a.m., Sept.	7..	Constructing concrete bridge.....	Thos. Homer, Co. Clk.
N. J., Freehold.....	11 a.m., Sept.	8..	Constructing Strauss bascule trunion bridge.....	J. M. Corlies, Dir. of Freeholders.
O., Marion.....	noon, Sept.	8..	Constructing three steel bridges, 101 to 160-foot span.....	V. Perle, Garfield, Clk. Bd.
D. C., Washington.....	2 p.m., Sept.	8..	300-ft. span steel bridge.....	A. P. Davis, Ch. Engr. U. S. Rec. Serv.
N. J., Matawan.....	11 a.m., Sept.	8..	Constructing Strauss bascule trunion bridge.....	C. E. Close, Clk., Bd. Freeholders.
Wash., Aberdeen.....	Sept.	8..	260-foot and 118-foot span steel bridges.....	L. D. Kelsey, City Engr.
Kan., Atchison.....	Sept.	8..	Three reinforced concrete bridges 10 to 35-ft. span.....	T. M. Voelker, Co. Clk.
Pa., Media.....	10 a.m., Sept.	9..	Constructing reinforced concrete bridge.....	J. Miller Quinn, Dep. Cont.
Mont., Dillon.....	11 a.m., Sept.	10..	Constructing 170-ft. and 42-ft. steel bridges.....	J. S. Baker, Co. Clk.
Wash., Walla Walla.....	2 p.m., Sept.	10..	102-foot steel truss bridge.....	County Commissioners.
Minn., Austin.....	4 p.m., Sept.	10..	Constructing nineteen bridges.....	O. J. Simmons, Co. Aud.
Mont., Delphia.....	Sept.	10..	Three bridges, 122 to 175-foot span.....	County Commissioners
Mo., Oregon.....	1.30 p.m., Sept.	10..	Constructing bridge and culverts.....	J. H. Peret, Co. Supv.
O., Columbus.....	2 p.m., Sept.	10..	Constructing bridge, cost \$1,695.....	Clinton Cowan, State Hwy. Comr.
Kan., Burlington.....	10 a.m., Sept.	11..	Abutment and wing wall for bridge.....	A. Fields, Ch. Co. Comrs.
W. Va., Berkeley Springs.....	Sept.	11..	90-ft. concrete bridge.....	M. S. Harmison, Clk. of Court.
Idaho, Hailey.....	10 a.m., Sept.	13..	Four steel bridges, 24 to 60-ft. span.....	G. A. McLeod, Clk. Co. Comrs.
O., Hamilton.....	10 a.m., Sept.	13..	Steel or concrete bridge over Miami River.....	W. W. Crawford, Co. Aud.
O., Norwalk.....	10.30 a.m., Sept.	14..	Improving bridge.....	C. E. Bloomer, Co. Aud.
O., Youngstown.....	Noon, Sept.	14..	Constructing steel bridge and removing old bridge.....	H. C. Fox, Clk. Public Serv.
Minn., Breckenridge.....	10 a.m., Sept.	14..	Nine steel bridges.....	E. E. Traux, Co. Aud.
N. Y., Albany.....	Noon, Sept.	14..	Constructing two highway bridges and a harbor and dock wall.....	W. W. Wotherspoon, Supt. P. W.
W. Va., Keyser.....	Sept.	14..	Two reinforced concrete bridges, 30 and 50-ft. span.....	J. V. Bell, Co. Clk.
Kan., Mankato.....	noon, Sept.	14..	Constructing five bridges and repairing eleven.....	State Engr. Manhattan, Kan.
O., Cincinnati.....	Noon, Sept.	17..	Constructing two concrete bridges.....	Albert Reinhardt, Clk. of Comrs.
O., Columbus.....	Noon, Sept.	17..	Constructing bridge; paving bridge.....	John Scott, Clk. Co. Comrs.
O., Steubenville.....	Noon, Sept.	17..	Concrete arch bridge No. 33.....	J. L. Means, Co. Aud.
Kan., Ellsworth.....	Sept.	18..	280-ft. steel & conc. bridge; repairing 250-ft. steel bridge.....	G. R. Wolf, Co. Engr.
O., Canton.....	10 a.m., Sept.	24..	Reconstructing floor system of steel bridge.....	Co. Comrs.
China, Hankow.....	Sept.	25..	Supplying 845 tons steel bridges.....	R. W. Hunt & Co., Monongahela Bldg., Pittsburgh, Pa.
Wyo., Newcastle.....	2 p.m., Oct.	5..	Constructing wooden bridge.....	W. H. Dobson, Clk. Co. Comrs.
Kan., Lawrence.....	Oct.	6..	Constructing steel bridges.....	H. Broecker, Co. Clk.
MISCELLANEOUS				
Pa., Pittsburgh.....	7.30 p.m., Sept.	6..	Const. conc. retaining wall; wrought iron pipe fence.....	S. R. Chase, Borough Clk., Aspinwall
Ohio, Columbus.....	noon, Sept.	7..	Two public comfort stations.....	J. A. Jones, Archt., Dispatch Annex Bldg.
Minn., St. Paul.....	10.30 a.m., Sept.	7..	405 barrels of cement for curbing.....	Aug. Hohenstein, Pur. Agt.
D. C., Washington.....	Sept.	7..	Constructing post office at Charlotte, N. C.....	Supervising Architect.
D. C., Washington.....	Sept.	7..	Constructing post office at Fulton, Mo.....	Supervising Architect.
Cal., San Jose.....	11 a.m., Sept.	7..	Enlarging and improving Canoas Creek by-pass.....	H. A. Pfister, Clerk.
D. C., Washington.....	Noon, Sept.	7..	One gasoline tractor.....	William Crozier, Chief of Ordnance, U. S. Army.
D. C., Washington.....	2 p.m., Sept.	8..	Twenty 1/4 to 3-ton motor trucks.....	A. S. Burleson, Postmaster.
O., Cleveland.....	Noon, Sept.	8..	Constructing retaining wall.....	A. R. Callow, Comr. Pur. & Sup.
D. C., Washington.....	Sept.	10..	Constructing post office at Gouverneur, N. Y.....	Supervising Architect.
Cal., Pasadena.....	7.30 p.m., Sept.	13..	Light-weight 5-passenger automobile.....	N. G. Felker, Clk. Bd. Ed.
D. C., Washington.....	2 p.m., Sept.	20..	Constructing retaining wall.....	District Comrs.
N. Y., New York.....	11 a.m., Sept.	21..	One 3-ton motor truck chassis and from one to ten 1 1/2-ton motor truck chassis.....	Col. A. L. Smith, Depot Q. M., Army Bldg.

STREETS AND ROADS

San Diego, Cal.—Additional state highway bonds to amount of \$50,000 have been sold by County Treasurer John F. Schwartz to Stephens & Co., of San Diego, the highest bidder. The amount of bid was \$47,061. The proceeds will be used in pushing state highway construction between San Diego and Im-

perial county line. The money is provided by state, county being liable for only \$2,939, amount realized for bonds below their par value.

San Diego, Cal.—It has been voted by County Supervisors to favor bond issue for roads.

San Francisco, Cal.—Board has decided to pave west side of Arguello Blvd., between Geary and Edwards Sts.;

Moraga, between 11th and 12th Aves., and south half of Mohawk, between Mission and Huron.

Wilmington, Del.—When Levy Court advertised for bids for binder materials for resurfacing stone roads there were many roads not included in the list. State Highway Commissioner Wilson took up matter of other roads which need to be improved in county, and Levy

Court instructed him to advertise for bids for stone, preparing roads for chips and binder, and for binder material. Bids were opened at meeting of the Levy Court Aug. 25 for following roads, the number of square yards being given: Philadelphia Turnpike, 18,927 sq. yds.; duPont Road, 12,000; City Line to Marshallton, 24,359; Marshallton to St. James Church, 11,816; Milford X roads, 14,080; Bird's Corner to Clark's, 9,171; Middle-town, St. Ann's, 3,215; Middletown, Maryland line, 21,754; Middletown, south, 2,676; Boyd's Corner, St. Georges, 24,302; St. Ann's, Ginn's Corner, 22,809; State Road, Duck Creek, 14,080; State Road, second section, 17,248. Bids were for asphalt, tarvia and ugite, and following were the bidders: Alfred H. McDowell, Walter S. French, Juniata Paving Co., Main Line Stone Co., United Gas Improvement Co., Atlantic Refining Co., Stewart & Donohue. Bids were referred to highway commissioner to be tabulated.

Saunder, Fla.—That Seminole County will vote for \$450,000 worth of bonds for good roads is almost an assured fact.

Alton, Ill.—Following is estimated cost of improvement of East 2d St.: 12,553 sq. yds. of vitrified brick paving on Portland cement concrete foundation 6 ins. thick, with a sand cushion 1½ in. thick and a Portland cement grout filler, surface dressed with ½ in. of sand, complete in place, at \$1.70 per sq. yd., \$21,440; 4,510 lin. ft. of pitch expansion joint between curbing and wearing surface on both sides of the paving 1 in. in width, complete in place, at 4 cts. per lin. ft., \$180.40; 3,427 cu. yds. excavating, grading and preparing subgrade, at \$0.50 per cu. yd., \$3,427; court costs and all necessary expenses, \$1,502.85; total, \$26,550.25.

Alton, Ill.—Paving of Staunton St. from Central Ave. to College Ave., is being considered.

Beardstown, Ill.—Many miles of Cass county roads will be improved under plan outlined at recent meeting of Board of Supervisors. Approximately 6 miles of stone and macadam highways will be constructed on Chanderville and Virginia Rds. State will meet half the expense.

Chicago, Ill.—Organization of International Pavedway Association, formed to promote automobile highway from Mexican to Canadian border, has been perfected here. The proposed route is as follows: Laredo, San Antonio, Austin, Waco, Fort Worth and Dallas, Tex.; Texarkana and Little Rock, Ark.; St. Louis, Springfield, Decatur and Danville, Ill.; Lafayette, Logansport and South Bend, Ind.; Dowagiac, Kalamazoo, Battle Creek, Jackson and Detroit, Mich. It was stated at meeting that automobile clubs have provided organization with \$100,000 for promotion work.

Chicago, Ill.—Organization of the International Paveway Association, formed to promote an automobile highway from the Mexican to the Canadian border, has been perfected. The road as planned will be 2,200 miles long, be paved with concrete or brick, cost \$20,000,000.

Joliet, Ill.—Concrete highway from Peoria to Chicago is being discussed. Proposed highway will be 186 miles long.

Ottawa, Ill.—The Ottawa Ave. paving ordinance has been finally passed by city council and it is expected that improvement will now go forward without any unnecessary delay.

Springfield, Ill.—Edwin H. White, county highway superintendent, has been elected vice-president of Logan-Lee Highway Association, which will extend road of same name through Springfield. Superintendent White will at once begin active preparation for making road through Sangamon County. The Logan-Lee highway enters Illinois at Brockport and extends through to Edinburg; thence through Berry and Rochester and into Springfield. After leaving this city trail will be marked through Middletown, New Holland, Delavan and on to Pekin. The trail then extends to Davenport, Iowa, where it connects with river to river road, and thence from Davenport to Council Bluffs.

Springfield, Ill.—Grand Blvd. from Williams Blvd. to South Grand Ave., a distance of about two blocks, will be paved by private agreement of property owners and park board if plans taken up at meeting of park board are carried out.

Waukegan, Ill.—Plans are completed practically for extension of new Lake Villa Rd. to point one-half mile south of southern end of strip that already has

been completed. Work will be started as soon as Contractor H. G. Goelitz sublets the contract.

Cedar Falls, Ia.—Council has adopted resolution ordering in new sidewalks on portions of 20th, 21st, Iowa and other streets.

Cherokee, Ia.—About 5,800 ft. of curb and gutter will be put in this fall, bids to be opened Sept. 10.

Clinton, Ia.—Committee on streets and alleys has recommended that Sixth Ave. be widened and repaved between First and Second Sts.

Clinton, Ia.—Council has adopted resolution which ordered construction of sidewalks on many streets and avenues in both ends of city, to complete permanent system of walks in city. There are about 59,000 sq. ft. of concrete walk to be built, which will cost in neighborhood of \$7,882.

Muscatine, Ia.—Farmers residing along road will make proposition to Board of Supervisors of Muscatine county offering to furnish men and teams for work at half price if county will agree to gravel Muscatine-Coneville Rd. for distance of two miles out from city limits.

Newton, Kan.—Another mile of paving has been assured in Newton.

Parsons, Kan.—A plan for connecting passed for paving, etc., of Ninth St. with well-improved highway was advanced by members of Parsons Chamber of Commerce at meeting of Cherryvale Commercial Club.

Pittsburg, Kan.—Ordinance has been passed for paving, etc., of Ninth St. with vitrified brick; also paving of Broadway.

Lancaster, Ky.—Previous bids for placing macadam surface on Lexington pike from Fork church to Kentucky river was rejected and County Clerk was ordered to advertise for other bids on this, to be received not later than Sept. 8.

Lexington, Ky.—That money realized from \$300,000 bond issue for reconstruction of Fayette County's road, if it is passed at election to be held on September 30, be expended under direction of commission composed of four members of Fiscal Court and four persons named by Fayette Good Roads Association is plan proposed by County Judge F. A. Bullock.

Lexington, Ky.—Election will be held Sept. 20 to vote on question of issuing road bonds in sum of \$300,000.

Louisville, Ky.—Following conference with Mayor Buschmeyer Board of Public Works decided on first block of street work to be done after Sept. 1, beginning of new fiscal year. The program, as decided, contemplates expenditure of approximately \$75,000 in street reconstruction alone. This is only work definitely decided on at present and will be undertaken immediately contracts are let early in September. Streets to be resurfaced and reconstructed are as follows: Main St. from Brook to 2d; 15th St. from Kentucky to Gallagher; 18th St. from Gallagher to Oak; 18th St. from Magnolia to Burnett. The above two streets to be reconstructed on account of Lincoln Highway; Kentucky St. from 8th to 11th; Chestnut St. from 4th to 5th; Washington St. from Brook to Floyd; Payne St. from Hamilton southwest 560 ft.; York St. from 7th to 8th; Main St. from Johnson to Bickel; 1st St. from Burnett to Hill; Brook St. from Breckinridge to Caldwell.

New Albany, Ky.—The reconstruction of New Albany and Paoli pike from New Albany and Lafayette township line through Lafayette and Greenville townships to Harrison county line will be done by contract. This was determined by Board of County Commissioners at special session in New Albany. It had been proposed that county do work by day under supervision of George Wright, superintendent of county highways. Board of Commissioners has directed E. B. Coolman, county engineer, to prepare plans and specifications, and to make estimate of cost of improvement. Recently the Floyd County Council appropriated \$41,000 for reconstruction of pike, which is part of Dixie highway.

Many, La.—Election in Sabine Parish resulted in favor of issuing road district No. 3 bonds in sum of \$35,000.

Monroe, La.—Ouachita parish through representative gathering of citizens at city hall went on record as favoring proposed system of state highways and resolution was unanimously passed calling on delegates from Ouachita parish to proposed Constitutional Convention to support plan outlined by Col. William

Polk, or any other plan that would give state good roads.

Long Island City, L. I.—Borough President Connolly has written to Board of Estimate, requesting that title be vested in Ulster, Smith, Spangler, 1117th, Dearborne and Lambertville Aves., in southern part of Jamaica district, and that, upon such action, resolutions be adopted authorizing regulating and grading of the streets.

Long Island City, L. I.—Facts are being gathered at Borough Hall in order to get information necessary to draft petitions for regulating and grading of Queens Blvd. from Diagonal St., Long Island City, to Jamaica. Considerable work along this line will be necessary before 200-ft. roadway can be made.

Riverhead, L. I.—The \$130,000 worth of 4½ per cent highway bonds sold Aug. 23 by County Treasurer Henry P. Tutthill were bid in by Cross & Wittmeyer of Manhattan, who offered \$101,467 for entire issue, or premium of \$1,908.07.

Baltimore, Md.—Engineering department of commissioners for opening streets is exerting every effort to complete 33d St., from St. Paul St. to Hillen Road, by October 1, according to report made to commissioners by Chief Engineer F. W. McKinney. This improvement was delayed for nearly six months by controversy between street opening commissioners and park board over the parking of the footways back of curb line. The contract involves about \$125,000 and is being executed by American Paving Co.

Baltimore, Md.—Specifications will be ready for advertising next week for paving about 1,350 ft. of the Alameda, from Hartford Ave. to the Garret property. This improvement will connect Clinton Park with the 33d St. Blvd. near Venable Park.

Lawrence, Mass.—Council has voted in favor of \$30,000 loan for sidewalk work.

Pittsfield, Mass.—Order has been adopted authorizing \$14,000 for new sidewalks.

Grand Rapids, Mich.—A special committee of which Alva W. Brown, head of Kent County Road Commission, is chairman, will meet in Lansing Aug. 28 to organize campaign for proposed Wolverine highway from Grand Haven to Detroit. Officers will be elected and date named for meeting at which Wolverine Highway Association will be formed.

Lansing, Mich.—With offers of subscriptions of \$200 a mile for 18 miles in Ingham county, and extraordinary financial assistance from millionaire of Saginaw, the plan to build concrete road from Detroit to Grand Haven has been started at meeting of trustees of Michigan Good Roads Association.

Ontonagon, Mich.—Election has resulted in favor of issuing highway improvement bonds in sum of \$10,000.

Duluth, Minn.—It has been decided to pave East First St. straight through to Congdon Park.

Duluth, Minn.—Morningside Park will soon have streets and alleys. In resolution introduced by Commissioner Farrell and adopted by Council, the streets and alleys desired by owners are ordered opened, and city attorney is directed to go ahead with condemnation proceedings. Council has also ordered 58th Ave. west paved from Elinor to Eighth St.

Greenville, Miss.—County will shortly vote on question of issuing road bonds in sum of \$750,000.

Pass Christian, Miss.—Bond issue is being considered for paving of principal streets.

Marysville, Mo.—The voters of Nodaway and Monroe Townships will decide in special election whether to issue special bonds for improving road conditions of two townships. The proposition in Nodaway Township is for \$35,000, while in Monroe it is \$25,000.

St. Joseph, Mo.—Ordinance has been passed to provide for paving with asphaltic concrete, Penn St. from 28th to 29th Sts., and constructing combination curb and gutter and sidewalks therealong and constructing curbing at the alleyways. Also ordinance providing for grading a highway along Commercial St. from 28th St. northeasterly and easterly to 29th St.; thence north along 29th St. to Commercial St., east; thence easterly to Agency road to establish grades and establishing a benefit district. Ordinance providing for grading Commercial St. from 22d to 28th Sts. to the established grades and prescribing a benefit district, and ordinance to provide for

constructing concrete sidewalks on 27th St. from Jules to Mulberry Sts.

Bilings, Mont.—The matter of securing pressure street flusher to replace present motor power flusher has been referred back to committee for further investigation.

Fremont, Neb.—Contracting firms will be required to make bids on 13 different kinds of material for paving of six districts for which Council ordered advertising. On six districts for which bids will be asked for, including Fourth, Eighth and Ninth Sts. and Nye and Military Aves. jobs, only one, Fourth St. project, will bidders be confined to one kind of material. The Fourth St. property owners have decided on granite concrete.

Fremont, Neb.—Council has voted to sell \$10,000 of intersection paving bonds to state. Sidewalks were ordered constructed along north side of 12th St. between Bell and Grant.

Hastings, Neb.—Paving Districts Nos. 28 to 44 have been created. About nine miles of pavement will be required. W. H. Fuller is City Engr.

Belleville, N. J.—Belleville Town Commission has passed resolution recommending to Board of Freeholders widening of Washington Ave. 5 ft. on each side from this city to Nutley lines.

Carlstadt, N. J.—Ordinance has been passed for improvement of Fifth St.

Elizabeth, N. J.—Work will soon be started on widening of paved portion of St. George Ave., between this city and Rahway Ave., at expenditure of \$20,000, half of which will be paid by this county and half by State. According to County Engineer Bauer, who has prepared plans and specifications and will submit them to Colonel E. A. Stevens, State Commissioner of Public Highways, job is expected to be completed by November 1.

Hammonton, N. J.—Hammonton Council has passed ordinance for concrete paving on Bellevue Ave. from County Blvd. to Third St. The town is to pay one-third of the cost and the county two-thirds, the State to reimburse the county.

Irrington, N. J.—Contract for repaving of Lyons Ave., Irrington, was not awarded Aug. 23, by road committee of Board of Freeholders when bids were received because of exceptionally low figure for excavating submitted by lowest bidder. Believing that mistake had been made in bid, County Engineer Frederic A. Reimer recommended that award be postponed a few days. Five bids were received for work of resurfacing road with bitulithic. The Glenfield Construction Co., of this city, was low at \$58,061.20. Other offers were: The Standard Bitulithic Co., \$63,464; Newark Paving Co., \$64,769; Van Keuren & Son, \$65,811, and John Dorer, \$69,674. The excavating, which was included in the total bid, was estimated at 18 cts. a yd. by the Glenfield Co. Van Keuren & Son asked 40 cts. a yd. for the same work, while the other three bidders asked 35 cts. a yd.

Irrington, N. J.—Bids for resurfacing other county roads about to be improved will not be received until next meeting of committee, September 7.

Irrington, N. J.—Because it was found one bidder made a mistake which placed him in line for job of paving Lyons Ave., Irrington, the Board of Freeholders threw out all of proposals for contract and decided to readvertise. The Glenfield Construction Co. made error giving an estimate of 18 cts. instead of 35 cts. a yard for excavation work. Next lowest bidder was the Standard Bitulithic Co., whose figures were \$63,464, as against \$58,061.20 for Glenfield Co.

Newark, N. J.—Bids will be received on Sept. 8 for \$470,000 Essex County road bonds and \$145,000 Essex County penitentiary bonds. A. W. Harrison is chairman.

Newark, N. J.—Bonds totaling \$615,000 will be sold Sept. 8 by Board of Freeholders to pay for improvements of county roads and institutions. Advertisements for sale was ratified Aug. 25 by finance committee. Bonds will be in two issues, both to run 20 years and to pay 4½ per cent. per annum. One issue of \$470,000 will be for road work and other, \$145,000, for additions at county penitentiary. Committee also recommended issuance of bonds for \$43,000 for improvement of two roads not included in larger issue that is to be sold. Of this, \$25,000 is to pay for resurfacing and grading of Laurel Ave. from Mt. Pleasant Ave., Livingston to Eagle Rock Ave., West Orange. The other is for the

resurfacing of Morris Turnpike, Millburn. Cost of this is \$36,000, of which State pays half. This work will be started in near future, as plans for work have been approved by State Road Commission.

New Brunswick, N. J.—Bids were received Aug. 23 by Board of Freeholders for extraordinary repairs to South Amboy-Keport road, but contract was not awarded. It is understood that bids will be carefully checked and contract for this important work, entailing expenditure of about \$80,000 will be awarded next Monday afternoon. The bids were received in two divisions, first being on Section No. 1 of this road, beginning at South Amboy city line and extending to tracks of New York & Long Branch Railroad Co., at Morgan's Station, a distance of 1½ miles, and maintaining an average width of 22 ft. throughout. This road is to be paved with vitrified paving brick on a concrete base. Thomas H. Riddle, of this city, presented the lowest estimate on this job, with a bid of \$37,948.85. The next lowest bidder was Meagher & Smith, a Perth Amboy firm, with a proposal of \$39,704.13. Following were bids received for first section of South Amboy-Keport road: H. B. Sproul Construction Co., of Peekskill, N. Y., \$47,681.40; Newark Paving Co., of Newark, \$42,147.60; Utility Construction Co., of this city, \$43,662.29; Abraham Jelin, of this city, \$41,121.38; Conrad Sebott, of this city, \$42,777.57; Thomas F. Dunigan, of Woodbridge, \$45,990.17; Thomas H. Riddle, of this city, \$37,948.85; Meagher & Smith, of Perth Amboy, \$39,704.13. Liddle & Pfeiffer, of Perth Amboy, also bid on this job, but it was not tallied. It was apparent on its face that it was not lower than the bid of Contractor Riddle. Following were bids received for second and third sections of South Amboy-Keport road: Cleveland Trim Paving Co., of Cleveland, O., \$48,942.59; Utility Construction Co., of this city, \$44,304.37; Liddle & Pfeiffer, of Perth Amboy, \$46,671.52; Abraham Jelin, \$40,885.65; Thomas H. Riddle, \$44,403.85; Empire Construction Co., \$46,725.92; Thos. F. Dunigan, \$42,838.19; Franklin Contracting Co., of New York, \$43,650.97; Eastern Paving Co., of Philadelphia, Pa., \$45,330.54. Following were bids received for repairs of Mill Run culvert: Francis Fee, Jr., of Keasbey, \$520; Chandler & Hoth, of this city, \$539; Christopher Marzella, of Metuchen, \$780; Abraham Jelin, of this city, \$380.

Pasausie, N. J.—Ordinance has been passed for laying of asphalt-bound macadam, etc., on Howard St. from High St. to Franklin Ave.

Albany, N. Y.—Following are 3 lowest bids received by State Highway Commission at its office, No. 55 Lancaster St., Albany, N. Y., for the construction of the following highways by state aid on Thursday, Aug. 26, 1915: Road No. 5588, Katterskill Clove, Greene County, 3.95 miles—James M. Hamilton & Co., Gardner, N. Y., \$98,639.50; St. Lawrence Cons. Co., Inc., Albany, N. Y., \$115,940.05; Abner M. Harper, Inc., Newburgh, N. Y., \$117,149.20. Road No. 5579, Mohawk-Paines Hollow, Herkimer County, 6.55 miles—Newport Cons. Co., Herkimer, N. Y., \$63,077; Jas. Anderson, Menands, N. Y., \$63,357.50; Jos. McCormick, E. Providence, R. I., \$67,782.50. Road No. 5584, Paines Hollow-Jordanville, Herkimer Co., 4.21 miles—Jos. McCormick, E. Providence, R. I., \$46,423.50; Newport Cons. Co., Herkimer, N. Y., \$48,957.50. Road No. 773—Wendellville-Lockport, Pt. 2, Niagara Co., 2.38 miles—The F. J. Mumm Contg. Co., Buffalo, N. Y., \$23,424.50. Road No. 799, Youngstown, Lockport, Pa. 2, Niagara Co., 4.21 miles—Arthur F. McConville, Ogdensburg, N. Y., \$53,156; Greenfield Cons. Co., Hornell, N. Y., \$54,245.40; Jos. Brumver, Buffalo, N. Y., \$54,909. Road No. 1315, Cambria-Willson, Niagara County, 8 miles—Jos. Brumver, Buffalo, N. Y., \$97,340.25; Serviss & Mackey, Youngstown, N. Y., \$101,902; Thos. F. Shaughnessy, Albany, N. Y., \$104,380. Road No. 1153, Lockport City, Market St. and Lake Ave., Niagara Co., 1.27 mile—Greenfield Cons. Co., Hornell, N. Y., \$69,644; Caleb Hyatt, Yonkers, N. Y., \$70,101.45; Langan Cons. Corp., Albany, N. Y., \$71,184.50. Road No. 5408, Fulton City, East 1st St., Oswego County, 0.36 mile—Oswego Cons. Co., Inc., Fulton, N. Y., \$16,490.80; Wm. H. Ring Contg. Co., Ogdensburg, N. Y., \$16,495.45; J. E. Bishop, Syracuse, N. Y., \$16,866.15. Road No. 817, Scotch Church, Blue Corners, Saratoga County, 3.57 miles—John Arborio, New Haven, Conn., \$34,960.50; Weed & Walsh, Mechanicsville, N. Y.,

\$35,092; John B. Dower, Ballston, Spa, N. Y., \$39,700. Road No. 1320, Mecklenburg-Perry City, Schuyler County, 2.75 miles—Patrick D. Conley, Ithaca, N. Y., \$25,380; Richard Hopkins, Troy, N. Y., \$26,804; Jas. Rossney, Buffalo, N. Y., \$27,202. Road No. 5575, Perry City, Trumansburg, Schuyler & Tompkins, 4.12 miles—Patrick D. Conley, Ithaca, N. Y., \$35,160.75; Jas. Rossney, Buffalo, N. Y., \$36,808.90; Sullivan Cons. Co., Syracuse, N. Y., \$37,784.65. Road No. 5577, Middleburg-Breakabeen, Schoharie County, 7.69 miles—Weed & Walsh, Mechanicsville, N. Y., \$91,046.50; Newport Cons. Co., Herkimer, N. Y., \$91,697; Jas. Anderson, Menands, N. Y., \$94,459. Road No. 5253-B, Jasper-Addison, Steuben County, 5.52 miles—Kennedy Cons. Co., Albany, N. Y., \$38,796.30; Greenfield Cons. Co., Hornell, N. Y., \$41,320.46; John C. Bradley, Corning, N. Y., \$43,573.15. Road No. 1076, Newark Valley-Berkshire, Part 2, Tioga County, 4.29 miles—Dana W. Robbins Co., Inc., New York City, \$35,354.50; T. H. Gill Co., Binghamton, N. Y., \$35,841.30; Richard Hopkins, Troy, N. Y., \$36,166. Road No. 1077, Newark Valley-Berkshire, Part 1, Tioga County, 4.72 miles—The Lane Cons. Corp., Meriden, Conn., \$36,148.10; T. H. Gill Co., Binghamton, N. Y., \$39,279.10; Dana W. Robbins, Inc., New York City, \$39,508. Road No. 1109, Cambridge-Ashgrove, Washington County, 2.06 miles—Wm. L. Sherrill, Hudson Falls, N. Y., \$16,975.70; Juniata Co., Philadelphia, Pa., \$17,331.80; Kellogg Boynton, Keeseville, N. Y., \$17,966.50. Road No. 5578, Whitehall-Dresden Center, Part 1, Washington County, 1.89 mile—Wm. G. Fox, Saratoga Springs, N. Y., \$29,582.35; Thos. H. Karr, Troy, N. Y., \$31,491.35; John B. Dower, Ballston Spa, N. Y., \$32,058.10. Road No. 1306, Williams Corners-Scott Corners, Westchester County, 5.72 miles—the Pierson Eng. & Cons. Co., Hartford, Conn., \$66,010.75; Frank G. Fowler Cons. Co., Mt. Kisco, N. Y., \$68,307.25; Harris-Rose Cons. Corp., New York City, \$68,619.75. Road No. 1307, Ossining-Millwood, Westchester County, 1.89 mile—Jas. Clascia & Vincent Cartesi, Mt. Vernon, N. Y., \$22,231; Frank G. Fowler Cons. Co., Mt. Kisco, N. Y., \$25,276; H. B. Sproul Cons. Co., Peekskill, N. Y., \$27,428. Road No. 1308, Hawthorne-Pleasantville, Westchester County, 2.15 miles—Jas. Garofano & Son, Mt. Vernon, N. Y., \$24,738.80; Jas. Clascia & Vincent Cartesi, Mt. Vernon, N. Y., \$25,700.70; John De Michael & Bro., Torrington, Conn., \$26,040.90. Road No. 1309, Peekskill-Putnam County Line, Westchester County, 6.63 miles—Henry Clinton, Poughkeepsie, N. Y., \$67,954.50; Conway Bros. & Kennedy, Eddyville, N. Y., \$71,653.50; H. B. Sproul Cons. Co., Inc., Peekskill, N. Y., \$73,168. Road No. 1323, Ossining-Kitchawan-Pine Bridge, Westchester Co., 4.62 miles—Frank G. Fowler Cons. Co., Mt. Kisco, N. Y., \$49,183.25; H. B. Sproul Cons. Co., Inc., Peekskill, N. Y., \$51,389.50; Wm. F. McCabe Cons. Co., Inc., White Plains, N. Y., \$58,528.20. Road No. 1325, Thorn Corner-Teed Corner, Westchester County, 2.81 miles—H. B. Sproul Cons. Co., Inc., Peekskill, N. Y., \$25,795.10; Jas. Garofano Sons, Inc., Mt. Vernon, N. Y., \$25,841.50; Frank G. Fowler Cons. Co., Mt. Kisco, N. Y., \$26,277. Road No. 1324, Whitehall Corner-Wright Corner, Westchester County, 3.02 miles—H. B. Sproul Cons. Co., Inc., Peekskill, N. Y., \$28,858.75; Caesar A. Rossi, Horicon, N. Y., \$28,871.20; Gruner & Hallenbeck, Harman, N. Y., \$29,120.50. Following are three lowest bids received by State Highway Commission at its office, 55 Lancaster St., Albany, N. Y., for the repair of the following highways by state aid on Thursday, Aug. 26, 1915: Repair Con. No. 839, road No. 463, Manheim Center-Salisbury, Herkimer County—J. J. Molloy, Schenectady, N. Y., \$18,797.71½; Huntoon & Ferguson, Hudson Falls, N. Y., \$20,088.29; Michael O'Brien, Cortland, N. Y., \$20,321.72. Repair Con. No. 852, road No. 359, Frankfort-Utica, Part 2, Herkimer County—John P. Dugan & Co., Amsterdam, N. Y., \$10,360.40; Newport Cons. Co., Herkimer, N. Y., \$10,569.35; Harry W. Roberts Co., Utica, N. Y., \$10,990.80. Repair Con. No. 848, road No. 71, Utica-Paris, Oneida County—Harry W. Roberts & Co., Utica, N. Y., \$13,649.52. Repair Con. No. 841, road No. 733, Ogdensburg-Canton, Part 1, St. Lawrence County—Arthur F. McConville, Ogdensburg, N. Y., \$20,551.40; Kellogg Boynton, Keeseville, N. Y., \$21,878.70. Repair Con. No. 844, road No. 640, Rotterdam Junction-Pattersonville, Schenectady County—J. J. Malloy, Schenectady, N. Y., \$8,706.10; John P. Dugan

Co., Amsterdam, N. Y., \$8,923.60; Huntoon & Ferguson, Hudson Falls, N. Y., \$8,936.50. Repair Con. No. 837, road No. 795, Jefferson-Kenoza, Lake-Fosterdale; road No. 823, Falls Mills-Callicoon; road No. 824, Stonebridge-Falls Mills, Sullivan County—George Meser, Liberty, N. Y., \$4,518; L. F. Bannin Plumbing, Heating & Contracting Co., Kingston, N. Y., \$4,839.25; Port Jervis Cons. Co., Port Jervis, N. Y., \$4,857. Repair Con. No. 843, road No. 5223, Liberty-County Line, Part 1, Sullivan County—Armstrong & Trowbridge, Middletown, N. Y., \$41,492.90; George Meser, Liberty, N. Y., \$42,327.40; Jackson Bros., Cuddebackville, N. Y., \$43,376.20. Repair Con. No. 838, road 503, Tarrytown-White Plains-Rye, Westchester County—Malloy & Murray Cont. Co., Yonkers, N. Y., \$96,243.40; Lewis Petrillo, Mt. Vernon, N. Y., \$97,517.60; Caleb Hyatt, Yonkers, N. Y., \$98,515.04. Repair Con. No. 847, road No. 19, Mamaroneck-White Plains, Westchester County—Jas. Garofano & Son, Inc., Mt. Vernon, N. Y., \$11,359.50; White & Colligan, Purchase, N. Y., \$11,755.; Wm. F. McCabe Contg. Co., Inc., White Plains, N. Y., \$12,576.50.

Cohocton, N. Y.—At special election Village Board was authorized to borrow \$2,000 or as much of that sum as necessary for improving Main St., vote being 101 in favor and 19 against. Appropriation is for making macadam roadway 20 instead of 16 ft. wide between Hoffman Hill and Larowe cemetery, except 100 ft. north and south of Maple Ave., where it will be full width of street. This section of street is part of State road now being built from Mattice corner south 7.31 miles by Dale Engineering Co., of Utica.

Dunkirk, N. Y.—Following paving bids have been received: Dunkirk Construction Co., Dunkirk, N. Y.—Brick on concrete foundation, \$1.64 per sq. yd.; sheet asphalt on concrete foundation, \$1.77 per sq. yd.; two-course concrete pavement, \$1.28 per sq. yd.; creosoted lug block, on concrete foundation, \$2.50 per sq. yd.; excavation, 50 cts. per cu. yd.; steel reinforcement in concrete pavement, 5 cts. per lb.; concrete curb and gutter, 49 cts. per lin. ft.; 4-in. drain tile and drainage, 10 cts. per lin. ft.; receivers reset, \$5 each. James McNamara, Dunkirk, N. Y.—Brick on concrete foundation, \$1.39 per sq. yd.; sheet asphalt on concrete foundation, \$1.71 per sq. yd.; 2-course concrete pavement, \$1.05 per sq. yd.; creosoted lug block, on concrete foundation, \$1.95 per sq. yd.; excavation, 35 cts. per cu. yd.; steel reinforcement in concrete pavement, 5 cts. per lb.; concrete curb and gutter, 45 cts. per lin. ft.; 4-in. drain tile and drainage, 10 cts. per lin. ft.; receivers reset, \$10 each. McCormick & Son, Erie, Pa.—Sheet and asphalt on concrete foundation, \$1.79 per sq. yd.; excavation, 45 cts. per cu. yd.; concrete curb and gutter, 51 cts. per lin. ft.; 4-in. drain tile and drainage, 9 cts. per lin. ft.; receivers reset, \$5 each. Following is statement of lowest bidders for each class of pavement: James McNamara, Dunkirk, N. Y., brick on concrete foundation at a total of \$6,497.85; sheet asphalt on concrete foundation at a total of \$7,622.65; 2-course concrete pavement at a total of \$5,902.75; creosoted lug block at a total of \$8,466.25.

Rochester, N. Y.—See "Miscellaneous."
High Point, N. C.—Steps have been taken for the early conversion of the old plank road in Glenola towards High Point into a modern highway. The mileage of road proposed to be improved is approximately 13, and will benefit large number of people. Estimated cost of doing this work is \$6,600, a portion of which is to be appropriated by Randolph County Commissioners.

North Wilkesboro, N. C.—The Town Commissioners and township authorities of North Wilkesboro are planning to complete work on road connecting Wilkesboro with North Wilkesboro.

Conneaut, O.—Bids will be received until 12 noon, Sept. 20, for improvement of State St. Work includes about 12,000 lin. ft. concrete curb, 14,400 sq. yds. asphalt or brick pavement with concrete base, 2,550 lin. ft. storm sewer, etc. S. W. Mahaffey is Director of Public Service.

Dayton, O.—See "Miscellaneous."
Marietta, O.—Estimate is to be made on resurfacing of Front St. from Putnam to intersection with Third St.

Marietta, O.—Ordinance calling for issuance of \$1,008 worth of 5 per cent. bonds for paving of Orchard, Quarry and Bank Sts. has been read for first time.

Westerville, O.—Bids will be received by village clerk until 12 noon, Sept. 23, for purchase of \$23,000 in bonds for improving of village streets. R. D. Bennett is Clerk.

Coquille, Ore.—Petition is in circulation asking that election be called to vote on question of issuing permanent road bonds in sum of \$370,000.

Beaver, Pa.—Preliminary plans now under consideration by Board of County Commissioners and State Highway Department may result in building of concrete road between Rochester and New Brighton to take place of present state highway.

Harrisburg, Pa.—New Milford people have asked Highway Commissioner Cunningham to give state aid for highway improvement in their town and received assurance that first money available would be used.

Midland, Pa.—Bids are being asked for grading, curbing and paving.

New Castle, Pa.—The last litigation concerning extension of Sampson St. to Harbor road has been completed and city will undertake its part of work immediately. City Engineer Milholland will prepare detailed plan immediately and within next few days it is probable that contract for work will be let.

Sumter, S. C.—Election will be held Sept. 7th for voting on bond issue of \$225,000 for improvements of streets and sidewalks.

Columbia, Tenn.—Board of Mayor and Aldermen has passed on third and final reading ordinance providing for paving and improvement of square.

Maryville, Tenn.—Bond issue of \$300,000 in Blount County was passed at the election by vote of six to one. Money is to be used on roads in Blount County, in building new pikes and in macadamizing those already graded.

Winchester, Tenn.—Election will be held Sept. 13 to vote on question of issuing road bonds in sum of \$350,000.

Beaumont, Tex.—Attorney general has approved of bonds in sum of \$85,000 for street improvements.

Beaumont, Tex.—Election will be held in Tyler County Aug. 28 to determine whether or not \$100,000 in bonds will be issued and sold for purpose of building 100 miles of improved highways in southern half of county. Road District No. 1 was created and election ordered by Commissioners' Court upon petition of more than a hundred taxpaying citizens and proponents of proposed issue are confident of victory. The district includes all of southern half of the county, embracing one of most productive sections of southeast Texas. If bond issue carries first highway built will run through center of Tyler County and connect with Hardin County road which, in turn, connects with Beaumont by way of Kountze and Voth.

Dallas, Tex.—A new plan to secure additional paving for Dallas is being studied by Street Commissioner Otto H. Lang. Commissioner Lang said he has not planned as yet to present it officially, but he is working on details.

Salt Lake City, Utah.—By vote of 3 to 1 City Commission decided to pave 13th East from 11th South to Westminster Ave.

El Paso, Tex.—In bond election when vote of people of El Paso County was polled on issuance of \$750,000 for road bonds and \$100,000 for county hospital and poor farm, the road bonds failed to carry by required two-thirds majority.

Rio Grande, Tex.—An international paved way is being discussed from the Rio Grande to the Great Lakes.

Salt Lake City, Utah.—Notice has been given of improvements as follows: To grade, curb and gutter with cement over Red Butte Gulch, construct drainage system of corrugated iron pipe 15 ins. in diameter, and pave with asphalt, said asphalt pavement to be 44 ft. between curbs and 8 in. thick, with 5-in. concrete base and 1½-in. binder and ¼-in. top. Fifteenth East St. from Yale Ave. to Tenth South St., in Paving District No. 32, according to the plans, specifications and profiles on file in office of City Engineer. Total cost of said improvement is estimated at \$13,524.69.

Norfolk, Va.—Granby St. pavement will be repaired from Main St. to Queen St. and repaved between car tracks and 2 ft. on each side from Queen St. to Smith's Creek bridge, if recommendations made by finance committee be approved by Council.

Seattle, Wash.—Resolutions have been adopted for improvement of various streets.

Seattle, Wash.—Paving of East and West Green Lake Way, from 412 ft. north of intersection of Interlake Ave. and North 55th St. to easterly margin of Woodland Park Ave., has been ordered. When completed, this improvement will give continuous paved street around Green Lake. Estimated cost is \$123,936.07.

Tacoma, Wash.—County Commissioners have authorized County Engineer L. H. White to make survey for 10.6 miles of mountain road and called for estimates on cost of hard surfacing from ten house end of present pavement, to top of Ohop Hill. The commissioners hope to see work started by 1916. This is largest single piece of paving ever taken up in this county. Tentative estimates of cost vary from \$100,000 to \$140,000, according to type and quality of pavement laid. The board members hope to see road completely paved to the National Park entrance. This would make it the finest tourist highway in America.

Charleston, W. Va.—Bids will be received until 12 noon, Sept. 7, for about 24,000 sq. yds. paving. B. A. Wise is City Manager.

Niagara Falls, Ont., Can.—Lundy's Lane is to be paved with macadam this year in accordance with plan of Welland County Council.

CONTRACTS AWARDED.

Los Angeles, Cal.—For improvement of Raphael St. to J. H. Shafer at following bid: 2¼ cts. per sq. ft. for grading to subgrade, Specifications No. 98; 2½ cts. per sq. ft. for cultivating, tamping and oiling, Specifications No. 98; 2½ cts. per sq. ft. for reggrading and re-rolling, Specifications No. 98; 32 cts. per lin. ft. for cement curb, Class A, Specifications No. 85; 11 cts. per sq. ft. for cement sidewalk, Specifications No. 84; 14½ cts. per sq. ft. for concrete gutter, Specifications No. 91. Horace B. Ferris is Secretary.

Santa Ana, Cal.—Hart & Ducey, contractors who have built many miles of paved road in this county, were successful bidders for building 3.16 miles of paved highway at Tustin. They have ten days in which to sign contract and fifteen days in which to start work. Roads to be improved under bid of \$9,229.20 are: First St., between Prospect Ave. and Newport Rd.; Main St., between California St. and Newport Rd.; Irvine Blvd., from Newport Rd. southeast three-fourths of a mile; Newport Rd. from First St. northeast to A. G. Finley's corner. The bids received for work were: Hart & Ducey, \$9,229.20; Moughmer & Roop, \$9,618.98; M. L. Hubermann, \$9,690.90; Isbell Construction Co., \$10,219.50; J. Driskell, \$10,452.62; Oscar Ford, \$10,701.76. Estimate of highway engineers on cost of road was \$9,990.52.

San Francisco, Cal.—Works Board has awarded street improvement contracts as follows: Paving Noe St., between Day and 30th, to D. L. Blenfield, for \$3,353; paving Laidley, between Castro and Roanoke, F. R. Ritchie & Co., \$1,525; paving Faxton, between Ocean Ave. and De Montford, F. R. Ritchie & Co., \$3,014; sewer, Drumm, from Jackson to Pacific, D. L. Blenfield, \$1,200; sewer and grading, Balboa, from 45th to 46th Ave., F. Rolandi, \$4,761.

Wilmington, Del.—Contract for resurfacing Philadelphia pike from city line to point near Practical Farmer was awarded Aug. 24 to Alfred McDowell. As soon as \$5,000 worth of work is done the work will then stop.

Kankakee, Ill.—For paving with brick on N. Fifth Ave. to F. L. Shidler, at \$17,944.

Fort Wayne, Ind.—Because no petitions for changes in material were filed with board of works the original orders for No. 2 block will go through on number of alley pavement jobs, and on Aug. 26 board of works will award contracts as follows: C. E. Moeller Construction Co., \$2.70 a lin. ft., alley between Wayne and Washington Sts., Nelson to Garden; \$2.63 a lin. ft., the alley between Packard and Organ Aves., South Wayne Ave. to Indiana Ave. Concrete was bid on in each case, but no petitions for this character of material were received. The board made its preliminary order brick, because of the ease with which this character of pavement may be ripped up for sub-surface construction work, such as sewers, water and gas mains, light and power conduits, etc.

Creston, Ia.—For 650 yds. concrete paving contract was awarded Aug. 23 to Hydraulic Concrete Construction Co., Davenport, Ia., at \$800.

Madison, Ky.—The first mile of inter-county road was let by contract Aug. 25 to N. E. Stone, of this city, his bid being \$1,413.13, and work is to be started on pike just as soon as contract is approved by State Road Department at Frankfort. The mile of road leads towards Dixon, the county seat of Webster County.

Madisonville, Ky.—Contract for first mile of county seat road was awarded Aug. 24 to N. E. Stone, of this city, his bid being \$5,413.13 and work is to be started on pike as soon as contract is approved by state road department. The mile of road leads out toward Dixon, county seat of Webster County. This road is in very bad condition. One of routes of the proposed Dixie bee line through this county takes in this road. Contracts for other three miles of road under state aid law, leading toward Princeton, Greenville and Hopkinsville will be let within the next month.

Hovell, Mich.—For paving portion of Grand River St., to William H. Ryan, Lansing, for Metropolitan block on concrete foundation, with cement fill at \$25,379.

Garfield, N. J.—Committee has decided to award contract for improvement of Gaston Ave., Irving Pl. and Morrell Pl. to DeNapoli & Torrell Co., of Hackensack. Contract for improving of Dewey St., Schley St., Sampson St. and Cedar St. will be awarded to Salvatore Guardilbani, of Lodi.

Garfield, N. J.—By Borough Council to John T. Harrop Co., contract for construction of large culvert through Van Winkle Ave.

Garfield, N. J.—Contract for improving of Gaston Ave., Irving Pl. and Morrell Pl. was awarded to DeNapoli & Torrell Co., of Hackensack. Contracts for improving of Sampson St., Schley St., Dewey St. and Cedar St. was awarded to Salvatore Guardilbani.

Springfield, N. J.—There was less than \$500 difference between highest and lowest bids received by township committee of Springfield at special meeting Aug. 26, for rebuilding Main St., from Millburn line to Morris Ave. John Dorer, of Irvington, was awarded contract at \$6,225. Highest bid was from Weldon Contracting Co., of Elizabeth, \$6,702. There were two other estimates, Bamberger & Chapman, of this city, \$6,253, and J. W. Winans, of Westfield, \$6,586. Road is to be rebuilt of amiesite to conform with new pavement in Main St., Millburn. It is expected that work will be started in less than two weeks.

Dunkirk, N. Y.—At adjourned meeting of Common Council Aug. 19 City Engineer Shelton submitted his tabulated report on bids for paving Woodrow Ave. (formerly Bass St.) from 4th to 6th St. The report shows that James McNamara of Dunkirk is low bidder on all classes of construction. His bid for brick on a concrete foundation is \$6,497.85; sheet asphalt on concrete foundation, \$7,622.65; two-course concrete pavement, \$5,902.75, and for creosoted lug-block, \$8,466.26.

Lockport, N. Y.—Board has awarded contract for construction of Shawnee road from city of Lockport at West Ave. westerly a distance of 1.91 miles to Stainthorpe & Co., for \$20,830.40. It will complete chain of good roads to Niagara Falls and North Tonawanda.

Phelps, N. Y.—Contract for paving Church St. with brick was awarded to Lake Shore Construction & Supply Co. by Village Trustees at meeting of board. Successful bidders are now at work on Main St. improvement and it is expected they will begin Church St. job in time to assure its completion by November. Street is to be paved from intersection of Main southerly to south line of New York Central property, approximately 2,500 sq. yds., at cost of \$6,443.50.

Rochester, N. Y.—Improvement contracts amounting to \$27,084.09 were awarded by Board of Contract and Supply Aug. 25th. The largest of them was laying of brick pavement in Cottage St., from Plymouth Ave. to Genesee St. It went to Whitmore, Rauber & Vicinus for \$13,361.50. Second big job was also awarded to Whitmore concern, a contract for laying of asphalt pavement in Granger place, from East Ave. to University Ave. The contract price is \$7,057.

Rochester, N. Y.—At meeting of Board of Contract and Supply improvement contracts were awarded for work, estimated cost of which is \$27,084.09. Work

included paving, sewer, walks, grading, etc. The contract for brick pavement in Cottage St., from Plymouth Ave. to Genesee St., was awarded to Whitmore, Rauber & Vicinus for \$13,361.50. That for an asphalt pavement in Granger Place also went to Whitmore, Rauber & Vicinus for \$7,057.

Saranac Lake, N. Y.—Residents of Helen St. will have sidewalk laid whole length of street before summer is over. Village Trustees let contract to Peter Tanzini to do work, which, at Mr. Tanzini's figures, will cost \$2,277.80.

Schenectady, N. Y.—Contractor J. J. Malloy of this city has been awarded two contracts by State Highway Commission in Albany. One is repair contract 839, road 463, Manheim Center-Salisbury, Herkimer County. Malloy was the lowest bidder among seven, his bid being \$18,797.71½. The other contract is repair contract 839, road 640, Rotterdam Junction - Pattersonville, Schenectady County. Malloy's bid for this contract was \$8,706.10.

Utica, N. Y.—A designation of bitulithic pavement for resurfacing Elm St., between Eagle and Leah Sts., was filed at meeting of Board of Contract and Supply. The contract for the work was awarded the Harry W. Roberts Co., as was contract for laying asphaltic concrete on Kenyon Court.

Columbus, O.—Road contracts aggregating \$98,616.90 were let by County Commissioners Aug. 23. The largest contract, for paving of Mock Rd., from 4th St. to Cleveland Ave., was let to B. F. Patterson on his bid of \$59,250.30. There were six other bidders. County engineers' estimate on improvement was \$72,732. Other contracts were let as follows: Karl Rd., Sharon Township, to W. O. Jewett, \$11,095.10; Manhattan Ave., Linden, to R. W. McCoy, \$9,135.70; McDonald Rd., Truro Township, to H. E. Barthman, \$10,087; Grove Ave., Truro Township, to H. E. Barthman, \$9,048.80.

Columbus, O.—More than \$600,000 of highway improvement and repair contracts were submitted to bidders Aug. 20 by Highway Commissioner Clinton Cowen. The improvements were scattered over most of state and many of contracts are to be completed this season, others going over for completion until next year. The contracts awarded were as follows: Fulton county—Toledo-Angola Rd., bridges, culverts and paving with waterbound macadam, 14 ft. wide, 2.52 miles, estimated cost \$23,226.29, to Gray Bros., Bowling Green, O., \$20,500. Fulton county—Archbold-Fayette Rd., bridges, culverts and paving with surface treated macadam, 14 ft. wide, 1 mile, estimated cost \$7,491.87, to Kelly Construction Co., \$7,400. Fulton county—Toledo-Angola Rd., bridges, culverts and paving with waterbound macadam, 14 ft. wide, 1 mile, estimated cost \$9,031.92, to Joseph L. Skeldon Engineering Co., Toledo, \$8,353.45. Guernsey county—Cambridge-Caldwell Rd., in two contracts, constructing bridges, culverts and paving with bituminous macadam, 16 ft. wide, 2.18 miles estimated cost \$30,218.84, to Petros & Palmer, Marietta, O., \$27,400 on contract No. 1. and second contract, bridges and culverts and grading roadway, 1.25 miles, 26 ft. wide, estimated cost \$9,725.60, to J. Ulm, Huntington, W. Va., \$8,465. Guernsey county—Cambridge-Caldwell Rd., constructing superstructure, estimated cost \$1,802.50, to Brookville Bridge Co., Brookville, O., \$1,444. Guernsey county—Cambridge Caldwell Rd., constructing arch over Willis creek, estimated cost \$11,549.50, to Noble Construction Co., Caldwell, O., \$10,000. Henry county—Wauscon-Napoleon Rd., constructing bridges, culverts and paving with surface treated macadam, 16 ft. wide, 5.65 miles, estimated cost \$54,966.11, to Richard Conway, Napoleon, O., \$45,190. Lucas county—Toledo-Napoleon Rd., bridges, culverts and paving with waterbound macadam, 16 ft. wide, 2.11 miles, estimated cost \$23,781.94, to C. W. Ryan, Maumee, O., \$18,500. Mahoning county—Akron-Candfield Rd., constructing bridges, culverts and paving with waterbound macadam, 14 ft. wide, 2.19 miles, estimated cost \$18,603.36, to L. H. Young Contracting Co., West Austintown, O., \$15,920.54. Portage county—Akron-Youngstown Rd., constructing bridges, culverts and paving with bituminous macadam, 14 ft. wide, 1.04 miles, estimated cost \$13,542.05, to L. H. Young Contracting Co., West Austintown, O., \$12,600. Sandusky county—Lima-Sandusky Rd., bridges, culverts and paving with surface treated mac-

adam, 16 ft. wide, 3.21 miles, estimated cost \$40,501.68, to Thomas Construction Co., Sandusky, O., \$34,836. Sandusky county—Lima-Sandusky Rd., bridges, culverts and paving with waterbound macadam, 16 ft. wide, 1.06 miles, estimated cost \$10,561.60, to Thomas Construction Co., Sandusky, O., \$8,256.76. Seneca county—Findlay-Tiffin Rd., bridges, culverts and paving with waterbound macadam, 14 ft. wide, 3.09 miles, estimated cost \$22,807.92, to H. D. Zees, Tiffin, O., \$19,984. Williams county—Bryan-Pioneer Rd., bridges, culverts and paving with waterbound macadam, 16 ft. wide, 3.18 miles, estimated cost \$30,581.17, to Public Contracting Co., Lorain, O., \$27,190. Alternative bids on that road for bituminous macadam will be received, estimated cost \$37,747.25. Lorain county—Oberlin-Elyria Rd., grading and paving with bituminous macadam, 14 ft. wide, 1.53 miles, estimated cost \$11,785.23, to Public Contracting Co., Lorain, O., \$10,031.74. Lorain county—Oberlin-Norwalk Rd., grading and paving with bituminous macadam, 14 ft. wide, 0.66 mile, estimated cost \$4,984.87, to Hart & Kemp, Elyria, O., \$4,541.77. Seneca county—Tiffin-Bellevue Rd., bridges, culverts, grading and paving with gravel macadam and reinforced concrete, 16 and 20 ft. wide, 3.49 miles, estimated cost \$28,202.20, to Knepper, Burr & Jaekle, Tiffin, O., \$25,945.61. Delaware county—Columbus-Sandusky Rd., reshaping and resurfacing with waterbound macadam, 16 ft. wide, 1.44 miles, estimated cost \$9,102.13, to John McNamara, Jr., Delaware, O., \$8,130.21. Marion county—Waldo-Marion Rd., constructing bridges, culverts, resurfacing with waterbound macadam, 16 ft. wide, 1.08 miles, estimated cost \$10,448.68, to L. L. Allen, La Rue, O., \$9,159.

Columbus, O.—Contracts for improvement of five roads have been awarded by County Commissioners. Mock road, between Fourth St. and Cleveland Ave., will be paved by B. F. Patterson, of Columbus, for \$59,250.30. Four macadamizing contracts awarded are as follows: Manhattan road, Clinton Township, to R. W. McCoy, of Worthington, for \$9,135.70; McDonald road, Truro Township, to H. E. Barthman, of Columbus, for \$10,087; extension of Grove Ave., Truro Township, to Mr. Barthman for \$9,048.80, and Karl road, Sharon Township, to W. O. Jewett, of Worthington, for \$11,095.10.

Columbus, O.—Last awards of contracts for street improvements for this season were made Aug. 27 by Service Director Borden. The residents of each street were allowed to select material with which their street is to be paved. The contracts awarded were: Como Ave. from High St. west, Monarch Construction Co., brick, \$15,959.40; Reynolds Ave., Cleveland Ave. to west terminus, Andrews Asphalt Paving Co., asphalt, \$6,757; New York Ave., Cleveland Ave. to west terminus, Andrews Asphalt Paving Co., asphalt, \$9,460; Sheldon Ave., Seventh St. to Parsons Ave., Andrews Asphalt Paving Co., asphalt, \$13,365; Perry St., Eighth to Tenth Aves., A. W. Burns & Co., brick, \$5,573; Kent St., Kimball Place Ave. to Kelton Ave., A. W. Burns & Co., brick, \$8,590; Wall St., Engler to College Sts., A. W. Burns & Co., brick, \$10,423; Blenkner St., High to Lazelle Sts., A. W. Burns & Co., brick, \$4,163; alley north of Tiffin St. from Abbot St. to the second alley west, George Geigle & Sons, brick, \$1,459; Main St., Parsons Ave. to Allen St., Cleveland Trinidad Paving Co., asphalt, \$8,114; Avon Court, Jefferson to Lexington Aves., Geo. Geigle & Son, brick, \$2,248; Forrest St., Parsons Ave. to Lockbourne road, A. G. Pugh, asphalt, \$44,547.

Lima, O.—Henry S. Enck was awarded contract Aug. 25 for asphalt block, as property owners had asked, upon his bid of \$8,614.

Middletown, O.—Street paving contracts covering work amounting to over \$45,000 were awarded by City Commission Aug. 20, Middletown firms receiving three of the jobs. Stroudbeck Brothers received contract for paving with concrete Iglehart Ave. between 2d and 3d Sts., at their bid of \$1,809.60. This firm also will have job of paving Woodlawn Ave. between Curtis and Sutphin, with concrete, for \$21,860. Sheet asphalt paving for First St. from Hydraulic to Clark, will be put down by Andrews Asphalt Paving Co. at its bid of \$14,869.20. The Arpp-Simpson Co. received contract for paving of Queen St. between Crawford St. to first alley east of Cleveland, with bituminous macadam and tarvla treatment, at its bid of \$7,000.08.

Sandusky, O.—Harry N. Bedell was awarded contract for hauling and spreading stone for Streckler road in Oxford and Milan Townships on his bid of \$2,940. County Commissioners will furnish material.

Portland, Ore.—Contract for resurfacing with bitulithic pavement Washington St. from 20th St. to Washington Park was let to Oskar Huber for \$10,635 by Council.

Philadelphia, Pa.—With proposals which aggregated \$61,296.60, the Barber Asphalt Paving Co. submitted on Aug. 23 the lowest estimates for the work of repairing and patching asphalt pavements in various parts of the city. One of contracts, for \$55,762, is subject to future appropriation by Councils. For other contract \$5,534.60 is available and work will start within short time. Price asked for furnishing, delivering and laying asphalt binder course was \$4.70 a ton on two contracts, while for furnishing, delivering and laying asphalt surface course the average price per ton was \$8.65. Councils will be asked to supply money for larger contract as soon as they reconvene next month.

South Bethlehem, Pa.—Street committee has been authorized to instruct Contractor R. S. Rathbun to proceed with paving of Market St., between 2d and 4th Aves., as per his contract. Same committee was authorized to have blue print made for paving of South Main St. Specifications for street paving were submitted by committee and were approved.

Dallas, Tex.—The Vibrolithic Co. was awarded Aug. 23 contract for paving Fitzhugh Ave. from Grand to East Side. Cost to be borne by property owners is \$16,898 and by the city \$4,415. The Standard Engineering Co. was given contract for paving Henderson from Ross to Monarch. Property owners will pay \$4,248 and the city \$825 of this cost.

Vernon, Tex.—City Council has awarded contract for paving four blocks of Main St. to Taylor Building Co. of Fort Worth. A reinforced concrete material will be used and approximate cost of job will be \$14,800.

Washington.—Following are itemized prices of Rajotte, Fobert & Winters, of Olympia, successful bidders, for improving McClellan Pass highway, Yakima County, from Naches to Summit: 38,160 cu. yds. common excav., inc. haul of 400 ft., 18 cts.; 37,330 cu. yds. loose rock excav., inc. haul of 400 ft., 30 cts.; 6,210 cu. yds. solid rock excav., inc. haul of 400 ft., 80 cts.; 2,150 cu. yds. overhaul on any of above materials, per each 100 ft., 1 ct.; 4.4 acres clearing, \$50; 2.5 acres grubbing, \$50; 700 cu. yds. rip rap, hand placed, \$1; 1,350 cu. yds. slope wall, \$1; rubble masonry, per cu. yd., \$2.50; concrete, first class, per cu. yd., \$15; concrete, second class, per cu. yd., \$12.50; steel reinforcing bars in place, per lb., 6 cts.; guard rail in place, inc. spikes and bolts, per lin. ft., 50 cts.; timber and plank in place, inc. spikes and bolts, per M ft., \$40; 922 lin. ft. plain concrete, 12-in. diam., \$1.20; 232 lin. ft. plain concrete, 18-in. diam., \$2.40; reinforced concrete, 18-in. diam., per ft., \$3.40; 64 lin. ft. reinforced concrete, 24-in. diam., per ft., \$4.25; 27 lin. ft. reinforced concrete, 30-in. diam., per ft., \$5.50; reinforced concrete, 36-in. diam., per ft., \$8; total, \$27,536.

SEWERAGE

Birmingham, Ala.—Surveys are being made for the proposed sewage disposal plant.

Marysville, Cal.—At citizens' meeting the labor unions of this city endorsed and pledged their support to proposed bond issue of \$13,000 for sanitary improvements, to be voted on at special election. It is proposed to extend E St. sewer along Tenth St., thence to D St. and up the latter to 14th St.

Pasadena, Cal.—A resolution has been adopted by Commission of city of Pasadena ordering work of constructing concrete storm water conduit for drainage purposes in said city.

Santa Ana, Cal.—The directors of Westminster Drainage District have called election to be held on Sept. 10 for purpose of voting upon proposal to issue \$25,000 bonds for construction of drainage system. District was organized recently. Estimates have been secured by directors upon which bond election is called. Main canal of district will empty into Anaheim Bay. District includes large area around Westminster.

South Pasadena, Cal.—City Trustees

have called for bids on laying of sewer pipe from pumping station in Arroyo Verde along right-of-way of Santa Fe and Hawthorne St. to Orange Grove Ave. This will be last of sewer work to complete city system for which bond issue was voted some time ago.

Stratford, Conn.—Installation of sewer system is being considered.

Leesburg, Fla.—Election will be held Sept. 11 to vote on question of issuing sewer bonds in sum of \$35,000.

Alton, Ill.—City officials will endeavor to complete sewer in eastern part of city as soon as possible.

Springfield, Ill.—A "sewer treating plant" to satisfy state law, favored by rivers and lakes commission, which contemplates purification of all sewage before it is allowed to enter stream of running water, may be established at mouth of town branch sewer. It is said that state law provides that money for construction of a sewage reducing plant may be raised by general taxation. To cover town branch sewer as is contemplated in specifications drawn by City Engineer Wade Seeley and to establish plant would cost approximately \$120,000.

Kokomo, Ind.—Resolution has been adopted for construction of 10-in. local tile sewer beginning in Phillips St. and one in Cottage St.

Oskaloosa, Ia.—Resolution has been adopted for construction of sanitary sewer on B Ave. west, between F and G Sts. Sewer to be constructed with 8-in. vitrified sewer pipe, house connections, Portland cement mortar joints, manholes, lampholes, Y-branches, risers and all necessary appurtenances thereunto belonging for the proper construction and operation of said sewer.

Lexington, Ky.—Ordinance calling for election on question of issuing \$350,000 in bonds for building of disposal field and main sanitary sewer system was given its first reading in perfected form at Board of Commissioners and laid over for one week. Of the \$350,000 to be voted, \$50,000 is to be used for construction of storm water sewers, and \$300,000, or such part as is necessary, for building of disposal field.

New Baltimore, Md.—Installation of sewer system is being considered.

Haverhill, Mass.—The order for building of Kenosza Ave. sewer was passed by city council. The sum of \$5,000 will be spent this year. Following petitions were referred to Alderman Wood: For surface sewer on Lawrence St., draining Rutherford Ave., Brockton Ave. extension and Lawrence St.

Lawrence, Mass.—Council has voted in favor of sewer loan of \$30,000.

Adrian, Mich.—That Adrian will find it necessary to reconstruct its entire sewer system is possibility confronting City Commissioners.

St. Paul, Minn.—City will receive bids up to Sept. 13 for building of so-called Fredericka-Fairmount sewer system. Following sizes and lengths of pipe will be used in building of said sewer. Approximate cost, \$145,000: 1,413 lin. ft. of 9-in. pipe, 3,744 ft. 12-in., 2,323 ft. 15-in., 3,610 ft. 18-in., 320 ft. 22-in., 1,330 ft. 24-in., 2,299 ft. 27-in., 659 ft. 30-in., 998 ft. 33-in., 331 ft. 36-in. pipe, 661.9 lin. ft. 4-in. sewer, 330.9 ft. 4-in. 6-in. sewer, 1,247.2 ft. 5-ft. sewer, 975.7 ft. 5-ft. 6-in. sewer and 2,646.4 ft. 6-ft. sewer, 53 manholes No. 1, 23 manholes No. 2, 80 catch basins, 1 catch basin connection and 1 junction. J. E. Carroll is Supt. of Construction and Repairs, and August Hohenstein is Purchasing Agent.

St. Joseph, Mo.—Ordinance has been passed to provide for construction of sewers in portion of Sewer Dist. No. 128, located in east and west alley first south of Logan St. from St. Joseph Ave. to north and south alley first west of St. Joseph Ave., thence north in last named alley into Logan St., thence west in Logan St. into 9th St.

St. Joseph, Mo.—Ordinance has been passed to provide for construction of sewers in portion of Sewer District No. 76, located in alley first north of Krug Park place from St. Joseph Ave. to 11th St.; also ordinance to provide for construction of sewers in portion of Sewer District No. 95, located in Second St. from alley first north of Dolman St. to north line of the district.

Atlantic City, N. J.—S. M. Neff, well known engineer, who has had charge of big engineering operations throughout country and personal charge of installation of Atlantic City's underground surface drainage system, has stated that he believed Atlantic City ought to go into high-pressure salt water main proposi-

tion on large scale or leave it alone. Cost of high pressure system would be over \$1,000,000.

Pasausie, N. J.—Ordinance has been passed for construction of sanitary sewer in Main Ave., between Highland Ave. and city limits.

Middletown, N. Y.—The three sanitary sewers which Board of Health requested common council to order constructed on Fairlawn Ave., Sproat St. and Wisner Ave. were ordered at the meeting of council on Aug. 23. Sewers are to run as follows: Beginning at junction of Wickham and Fairlawn Aves. and extending southeasterly through Fairlawn Ave. about 450 ft. Beginning at junction of Sproat St. and Wickham Ave. and extending northeasterly through Sproat St., distance of about 1,500 ft. Beginning at intersection of Cottage St. and Wisner Ave. and extending southeasterly through Wisner Ave. to Wickham Ave., a distance of about 900 ft.

Rochester, N. Y.—See "Miscellaneous." **Schenectady, N. Y.**—Common council has taken an important step toward relieving pressure in matter of sewer service for large section of city. An ordinance was adopted for construction of new section of interceptor extending from main interceptor at Front St. gate of American Locomotive Co.'s plant up through North Jay St., South Ave., Romeyn St., Myers Alley, Park Pl. to Union St., and thence on to connections with prospective sewers. The Board of Contract and Supply was authorized to advertise for bids on work and payment was also authorized from sewer bond issues. It is estimated in this report that sewer is called upon to handle 5,000,000 gallons of sewage per day in dry weather conditions. Capacity of a 20-in. sewer on a 5-10 per cent. grade is only 4,700,000 per day.

Utica, N. Y.—Plans and specifications were filed by City Engineer Kemper for sewer on Cromwell Ave., from Carlisle Ave. to Amy Ave.; also for one catch basin on south side of Oak St., between Martin and York Sts. Proposals will be received by board at 2:30 p. m., Sept. 1, when proposals for sidewalks and crosswalks in various parts of city will also be received.

Rocky Mount, N. C.—Bonds in sum of \$25,000 have been voted for complete sewerage system.

Winston-Salem, N. C.—Sewer committee of Board of Aldermen is having plans prepared for complete sewer system for West Salem and also that section of North Winston traversed by Patterson Ave. and in vicinity of North Winston graded school. Superintendent of Works Jones has had his engineers surveying for proposed lines recently and two systems which will tie into system already developed are expected to be ready for action of Board of Aldermen soon.

Howling Green, O.—Resolutions have been adopted for construction of sewers in various streets.

Dayton, O.—See "Miscellaneous."

Marlow, Okla.—City of Marlow will have special election on Sept. 16 to vote on question of issuing bonds in amount of \$15,000 to provide funds for main sanitary sewer system. Bonds have been sold to R. J. Edwards, of Oklahoma City, who will prepare procedure. City has employed the Benham Engineering Co., 13th floor, Colcord Bldg., Oklahoma City, as consulting engineers to make surveys, plans, specifications and supervise the construction work.

Lebanon, Pa.—City Council met in special session for purpose of opening bids on proposed new sewer disposal plant for second unit of city sewer system. Despite fact that city engineer had received application for plans and specifications from 17 contractors only seven of them entered bids and of that number one was informal, because of omission of an item. On rough estimate taken from figures as they stand uncompleted the Pitt Co., Pittsburg, is low, and local firm of Bennett & Randall is next to them. It is very probable that Pitt Co., a new contracting firm to enter this city, will, upon recommendation of City Engineer T. R. Crowell, receive the contract which will amount to sum between \$40,000 and \$50,000.

Midland, Pa.—Since passage of recent \$30,000 bond issue, borough authorities are preparing to make further extensive improvements in town of Midland. Town Council is now asking for bids on construction of approximately 3,000 ft. of 8-in. sanitary sewer, 4,000 ft. of storm sewer varying from 12 to 48 ins.

Park City, Tenn.—Practically every point in Park City will have sewer connections within next few months. An ordinance has been prepared for this special work. It includes all sewer work that is needed in municipality. This work will be under supervision of sewer committee of council, headed by W. F. Dick, as chairman.

Beaumont, Tex.—Attorney general has approved of bonds in sum of \$30,000 for sewer extension.

Dallas, Tex.—Bids on construction of three more units of municipal sewage disposal plant were tabulated Aug. 27 by James H. Fuertes, engineering expert who drew the plans. The lowest possible estimate on contracts 5, 6 and 7 aggregated \$596,201.17. The city has but \$460,000 remaining for the work. As result of this situation sprinkling plant at disposal works proper will be dispensed with, saving \$210,000. This part of plant is not considered absolutely indispensable at this time and can be built later. This would leave \$386,000 to be expended now. The lowest bid on two contracts, five and seven, was submitted by Bailey, Reeder & Co., of Mobile, Ala., the only bidders outside of Texas. Their bid on contract 5, which is composed of the concrete part of the North Dallas interceptor, extending from the plant of the Dallas Electric Light & Power Co. to the sewage pumping station at the foot of Cadiz St., is \$80,708.29. It was only \$500 less than the next highest bid. Same firm was \$50,000 lower than next best bidder on contract No. 7. This work includes the disposal plant proper and the force main from the disposal tanks to the pumping station. The Mobile firm's bid was \$417,058.83, including the sprinkling system, which will be eliminated. The Roach-Mannigan Co., of Dallas and Fort Worth, bid low on the pumping station and the main across the river at Cadiz St. This bid was \$98,434.35. Only two firms bid on this contract. A tabulation of bids follows: Bidder—General Construction Co., Fort Worth, contract 5, \$119,843.52; F. B. Horton & Son, Houston, contract 5, \$109,423.50; Bailey, Reeder & Co., Mobile, Ala., contract 5, \$80,708.29, contract 7, \$417,058.83; Tarrant Construction Co., Fort Worth, contract 5, \$108,373.08; Winsett-Eldridge Co., Dallas, contract 5, \$119,080.50; T. A. Garvin, San Antonio, contract 5, \$81,195; Roach-Mannigan Co., Dallas, contract 5, \$128,887.50, contract 6, \$98,434.35, contract 7, \$515,501.92; Jas. Stewart & Co., Houston, contract 5, \$131,484.10, contract 6, \$107,630.60, contract 7, \$527,269.35; Mayfield & Shaw, El Paso, contract 7, \$545,938.20; H. C. Gass, San Antonio, contract 7, \$467,274.30.

Dallas, Tex.—Bids on laying new outlet sewer in Oak Cliff were called for on recommendation of Commissioner Cason. Funds were provided for this work, with list of other sewer corrections to be made when waterworks budget was adopted.

Salt Lake City, Utah.—Construction of sewer lateral of vitrified pipe 8 in. in diameter in West Jackson Ave. is planned.

Milwaukee, Wis.—Action has been taken by judiciary committee on measure to have bonds in sum of \$400,000 issued to finance sewerage commission in construction of intercepting sewers.

CONTRACTS AWARDED.

Los Angeles, Cal.—To Lawrence Skochellch, for sewer in Myra Ave., at \$25,389.

Clayton, Del.—Contract for Clayton water works and sewer system has been awarded to Ambler-Davis Co., of Philadelphia.

Cedar Falls, Ia.—The Thor Construction Co., of this city, was low bidder at letting of storm sewer work by Council. The job amounts to \$2,948.39, according to low bid, and includes some half dozen sewer extensions about city. The sewers range from 3 ft. to 4½ ft. in diameter. Some are to be of concrete and some of brick construction.

Cherokee, Ia.—The Moore-Sleg Cont. Co., of Waterloo, Ia., will start about Sept. 1 on extension to sewer system of about 18,000 ft.

Creston, Ia.—For construction of sanitary sewer, contract was awarded Aug. 23 to Jos McLaughlin, Creston, Ia., at \$1,234.39.

Fenton, Mich.—The sanitary sewer system controversy has been brought to a terminus. The ballot was unanimous Aug. 23 in favor of letting contract to M. J. Meather Co., of Bay City, work to be commenced immediately. Contracted

figure as set by this company for constructing Fenton's new sewer system is \$15,031.88.

Stillwater, Minn.—To McGee & Nolan, city, contract to construct sanitary sewer on Churchill St., 2d to 4th Sts., and on south 4th St., from Churchill to Orleans Sts., for \$7,689.

St. Louis, Mo.—By Bd. Pub. Service for constructing Florissant Ave. sewer, Extension Nos. 1 and 2, and Florissant Ave. inlet line, to Myers Constr. Co., 506 Olive St. Work will require approximately 422 ft. 5 in., 20 ft. 33-in. inside diameter circular brick sewer, 2,180 ft. 18, 15 and 12-in. vitr. clay pipe sewer.

Omaha, Neb.—To Offerman Const. Co. of South Omaha at \$6,947 to construct 800 lin. ft. of 18-in. pipe sewer, 48 "Y's" 6x18 in. and 407 lbs. of cast iron and 4 manholes.

Oswego, N. Y.—By Dept. Works for sewer construction, about 9,722 ft. 8 to 22-in. vitr. tile sewer, 3,956 ft. 24, 27, 30, 36 and 42-in. reinforced concrete or vitr. tile sewer, 312 Y branches, as follows: Contract Q, to Samuel Bom, Syracuse, \$7,872; Contract R, to Ralph Reilly, Utica, \$8,793; Contract S, to Broderick & Fingerhut, Oswego, \$1,734; Contract T, to L. Tremitt, Oswego, \$2,854; Contract U, to Ralph Reilly, Utica, \$14,764; Contract V, to R. Compo, Oswego, \$1,896. Charles W. Linsley, Comr. of Wks.

Oswego, N. Y.—Contracts for storm water and sanitary sewers costing thousands of dollars were awarded Aug. 23 by Commissioner of Public Works Chas. W. Linsley. Proposed sewers will be part of improved sewer system now in progress of construction. Indications are that work will be carried on by contractors during the winter. Following are contracts awarded by Commissioner Linsley: Storm water, West Mohawk, Sixth to Singleton; in Singleton, Mohawk to Oneida and through private right of way from Mohawk to Sixth St.; sanitary sewer, Oneida to Mohawk in Eighth. Contractor Ralph E. Reilly, Utica, \$14,747.62. West Albany, 10th to Singleton, storm and sanitary, tile sewer, 12, 15 and 36 in. Contractor, Samuel Bonn, \$7,872. Dublin, West Oneida, south to Mohawk, storm sewer; West Oneida, Seventh to Hunt's Creek. Contractor, Ralph E. Reilly, \$8,293.93. Sanitary sewer, Tallman sewer, between Fifth and Seventh Sts.; West Second, Niagara to Ohio; 8 and 10-in. tile. Contractor, Broderick & Fingerhut, \$1,734. Sanitary sewer, East Mohawk, Ninth to 10th; Duer, Mohawk to Utica; East Eighth, Bonner to Hamilton; East Eighth, Seneca to Schuyler; Hamilton, Seventh to Eighth. Contractor, Luciano Tremitt, \$2,853.65. Sanitary sewer, West Sixth, Cayuga to Seneca; West Eighth, Cayuga to Mohawk, 8 and 10-in. tile. Contractor, Raffaele Compo, \$1,895.06.

Rochester, N. Y.—James Passero was low bidder on contract for sewer, walks and grading in Delmain Crescent, from Winton Rd. to Blossom Rd., at \$4,404.50. He was awarded this contract and one for laying of water pipe in Curtice St., his bid on latter being \$471.10.

Warrenton, N. C.—To M. W. Wilkes of Atlanta, Ga., contract by Board of Commissioners for sewerage system to include about 7½ miles of 8-in. to 15-in. pipe sewers. Gilbert C. White is engineer, Charlotte.

Troy, O.—Board of Control has awarded contract for sanitary sewer on South Crawford St., from Big Four Railroad to Dakota St., to Hennessey Bros., at their bid of \$1,165.08. Bid of Pat Sweeney and W. G. Wilson was \$1,189.32.

Hazleton, Pa.—Bids for construction of sewer on Laurel St., between Seventh and Eleventh Sts., were opened Aug. 24. As Arlo A. Ruth was lowest on all of items advertised for, it was considered unnecessary to tabulate all of bids. Mr. Ruth was awarded contract for sum of \$1,619.

Woonsocket, R. I.—Contract for 4,400 ft. 8-in. sewer and 500 ft. 15-in. sewer to the Eastern Const. Co., of Woonsocket. R. I. F. H. Mills is C. E.

Salt Lake City, Utah.—To Gibbons Bros., Reed & Roche, 1018 Lake St., Salt Lake City, for sewer extension No. 354, to be of reinforced concrete pipe (Meriwether type). Itemized bid as follows: 132,718 cu. yds. ex. and backfill, 97 cts.; 699 lin. ft. sewer, 20 in., \$2.35; 2,437 lin. ft. sewer, 42 in., \$3.75; 6,628 lin. ft. sewer, 60 in., \$5.10; 8,838 lin. ft. sewer, 66 in., \$6.50; 3,706 lin. ft. sewer, 72 in., \$8;

1,691 lin. ft. sewer, 78 in., \$10; 4 special manholes, each \$10; 61 regular manholes, each \$61; 190 M ft. lumber in trench, \$33.10; 4,000 cu. yds. gravel fill in place, \$1.92; 25 cu. yds. conc., Class A, \$8; 1,000 lb. steel reinforcement, \$0.045; 100 sq. yds. asphalt pavement, \$2.40; 250 sq. yds. cement sidewalk, 10 cts.; 40 lin. ft. concrete pipe, 8 in., 27 cts.; 40 lin. ft. concrete pipe, 10 in., 36 cts.; 40 lin. ft. concrete pipe, 12 in., 44 cts.; 40 lin. ft. concrete pipe, 15 in., 50 cts.; 40 lin. ft. concrete pipe, 18 in., 83 cts.; 40 lin. ft. concrete pipe, 21 in., \$1.02; 40 lin. ft. concrete pipe, 24 in., \$1.31. Total, \$296,510.

WATER SUPPLY

Heber Springs, Ark.—City is planning to install water works and sewer system at estimated cost of \$80,000. E. R. Brown is Recorder.

Oceanside, Cal.—Election has resulted in favor of issuing water system bonds in sum of \$12,000.

Pomona, Cal.—Purchase of plant of Consolidated Water Company, or installation of new water system, is being considered.

Sacramento, Cal.—The entire suburban district of Sacramento will be furnished with new water mains under new water main system by some date in December, according to city officials, who are following work closely.

Santa Monica, Cal.—City will shortly vote on question of issuing water bonds in sum of \$712,500.

Woodland, Cal.—Elaborate plans for extension of water and sewer system of Woodland are being discussed by Woodland City Council. It is likely the citizens soon will be asked to vote large sum for work.

Cherokee, Ia.—City has purchased an Ingersoll-Rand air compressor to be installed at city water station to assist the steam pumps by increasing flow of water into the reservoirs.

Attica, Kan.—Electors have voted \$30,000 bond issue for purpose of constructing municipal water and light plant.

Pratt, Kan.—Special election will be held Sept. 9 to vote on question of issuing water works system bonds in sum of \$29,000.

Topeka, Kan.—Twelve hundred dollars will be spent by city to put into first class condition pumping station at foot of Fairchild St. in North Topeka and to provide for complete set of parts for both pump and the motor. Chief among improvements at station will be installation of new bronze flood gate.

Pass Christian, Miss.—Bond issue is being considered for securing up-to-date water works and fire protection.

St. Joseph, Mo.—Ordinance has been passed ordering the St. Joseph Water Co. to lay water main on Shady Ave. from St. Joseph Ave. to Fifth St. and locate fire hydrants thereon.

Whitehall, Mont.—Election has resulted by vote of 81 to 14 in favor of issuing water works and sewer bonds in sum of \$30,000.

Cortland, Neb.—Election will be held Aug. 31 to vote on question of issuing water works system bonds in sum of \$10,000.

East Orange, N. J.—Bids opened at a special meeting of the East Orange Water Commissioners Aug. 26 brought the prospective cost of extension of water mains in that city well within appropriation to be afforded by bond issue of \$125,000. It now remains only to sell the bonds. A low bid of 5 14-100 cts. a lb. for pig lead, of which 130,000 lbs. will be required, brought cost to \$6,682. That figure was offered by Bruce & Cook of New York. The low bid for construction was \$41,911.40, from F. N. Lewis, of New York. Low figure for valves was \$11,346.50, submitted by Pratt & Cady Co., of New York. Some time ago commission let contract for necessary iron pipe at total figure of \$60,000. Total of prices comes to \$119,939.90. The water department, according to Engineer Arthur A. Reimer, is ready to start work as soon as sale of bonds makes necessary funds available. Only two bids were received for lead and other, which was submitted by United Lead Co., was but 1-100 ct. higher per lb. The highest bid for the valves was \$14,473 and for the construction work, \$57,592.20.

West Orange, N. J.—Proposition to purchase plant of local water company at price not to exceed \$300,000 was carried at special election Aug. 16. Geo. W. Foster is Town Clerk.

Peapack, N. J.—Election has resulted by vote of 68 to 17 in favor of issuing water system bonds in sum of \$55,000. F. H. Ludlow is Borough Clerk.

Schenectady, N. Y.—Bids for rearranging piping at Rotterdam pumping station, dividing of underground distribution system into two zones and installation of reduction valves will be received at meeting of the Board of Contract and Supply.

Westbury, L. I., N. Y.—Extension of water plant in Carle Place district is being planned.

Rocky Mount, N. C.—Bonds in sum of \$10,000 have been voted for water works extensions and improvements.

Brewster, O.—Fifteen bids have been received for construction of municipal water works in Brewster, to cost approximately \$21,000. Bids which have been filed by firms from Chicago, Toledo, Cleveland, Pittsburgh and other cities are either for part or whole of construction work. Council will meet to take action on them.

Cincinnati, O.—Covington City Commissioners in order to ascertain relative cost of crossing Licking River with emergency main, when based on competitive bidding, have asked Consulting Engineer Horning to prepare specifications for alternate methods of making duplicate main cross river. One of the methods is to submerge main, other to erect bridge to carry the pipe.

Middletown, O.—Another step in improvement of water works system as result of recent bond issue was taken when committee on water works and superintendent were authorized to secure estimates on extension of water mains out First St., and thence through east end, as proposed in Pollard plans.

Reynoldsville, Pa.—Citizens will shortly vote on bonding of borough to the amount of \$100,000 for purpose of purchasing present water works or of building or securing new municipal water works. There is no doubt but that question will carry by large majority.

Beaumont, Tex.—At special session Aug. 24 the City Council opened bids on improvements to be made in municipal water works system. The bids average about \$25,000. They were considered too high and rejected. Other bids will be advertised for.

Fort Worth, Tex.—City Commission has voted to adopt City Engineer Von Zuben's recommendation for further rock and earth filling at north end of dam.

Mart, Tex.—Election has resulted by vote of 107 to 18 in favor of issuing water works improvement bonds in sum of \$21,000.

CONTRACTS AWARDED.

Clinton, Ill.—By city council, to Davis Ewing Concrete Co., Bloomington, for reservoir, at \$6,644. Engineers are Fleming, Enger & Babbet, Champaign.

Cherokee, Ia.—Swanson & Betsworth, of Cherokee, have contract for laying about 3,000 ft. of water pipe, being an extension to present system.

Denison, Ia.—By City Council for sinking deep well to W. H. Gray & Co., Chicago, Ill., at \$6,000.

Syracuse, Neb.—For erecting water tower to Chicago Bridge & Iron Works at \$3,999 and for water mains, hydrants and valves, \$3,788. Wm. Stanbro is Clk.

Iilon, N. Y.—By Board of Water Commissioners, for about 3½ miles 10-in. c-i. pipe and constructing concrete diverting dam, intake chamber and gate house, to C. A. Chatham, Syracuse, at \$12,832. J. D. Ringwood is city engineer.

Middletown, N. Y.—At opening of bids for building of Centerville Station water works the Abner Harper Co., Inc. of Newburgh, secured job of laying pipe and setting hydrants for \$8,277.90, and R. D. Wood & Co., of Philadelphia, secured contract for pipe, hydrants and specials for sum of \$10,833.80. Work is to begin at once and is to be completed by November 15.

New York, N. Y.—To Sullivan Mach'y Co., 30 Church St., city, at \$12,145 contract by Board of Water Supply for making six borings through rock, each over 500 ft. deep, at east shaft of Hudson siphon of Catskill aqueduct in town of Fishkill.

Rochester, N. Y.—For laying water pipe in Curcise St., to James Passero, at \$471.10.

Schenectady, N. Y.—Contract for rearranging piping at Rotterdam pumpine station, for dividing underground dis-

tribution system into two zones and for installing reducing valves, was awarded H. J. Corbin, of New York City, at meeting of the Board of Contract and Supply, Aug. 25, for \$24,690. The firm of Brown & Lowe, of this city, was also a bidder. Its bid was \$27,870 or \$3,180 higher than other company.

Warrenton, N. C.—To M. W. Wilkes of Atlanta, Ga., contract for water works, to include two motor-driven triplex pumps, pumping buildings and collecting well, 2¼-mile pole line, 75,000-gal. tower and tank, and about 6½ miles of 6-in. and 18-in. cast-iron pipe line. Gilbert C. White is engineer, Charlotte.

Coshocton, O.—To Kinsner & Son, Delaware, for constructing 3,000,000-gallon reservoir at \$40,000.

Warrenton, Ore.—The municipality of Warrenton has awarded contract for supplying wood pipe for its water system to National Tank & Pipe Co., a local concern. The materials will all be furnished from resources of this state, and it will cost in neighborhood of \$150,000.

Dallas, Tex.—Contract was awarded by Board of Commissioners to Alderson Hardware Co. for furnishing 48,000 three-quarter-inch water meter connections. The bid was \$1,800.

LIGHTING AND POWER

Orange, Cal.—City trustees have submitted to Merchants & Manufacturers Association plan for installation of from 36 to 44 ornamental street lights. It is proposed that property owners pay for installation of lights, city to pay for electricity.

Pasadena, Cal.—A resolution of commission of city of Pasadena has been passed of its intention to order construction and installation of lighting posts, wires, pipes, lamps and other suitable and necessary appliances in, upon and along Mentor Court between the easterly line of Terrace Drive to point distant 243 ft. east of easterly line of Terrace Drive, for purpose of lighting same and determining that bonds shall be issued to represent cost thereof.

Peoria, Ill.—Committee appointed to consider feasibility of establishing municipal electric plant has submitted report estimating cost at \$33,389. E. D. Jeffries is city engineer.

Springfield, Ill.—Installation of ornamental lighting system on Washington St. from First to Tenth St. and on Monroe St. from Spring to Tenth St. is being planned by business men.

Marathon, Ia.—Election will be held in near future to vote on question of issuing municipal electric light plant bonds in sum of \$12,000.

Ellinwood, Kan.—Election will be held Sept. 1 to vote on question of issuing electric light plant improvement bonds in sum of \$15,000.

Haviland, Kan.—Town will receive bids for installation of electric distributing system to cost about \$11,000.

Baltimore, Md.—Establishment of municipal lighting plant, power to be obtained from Jones Falls, is being considered by Mayor Preston. Plans are being considered by Ezra B. Whitman, consulting engineer to Water Board. Estimated cost, \$200,000.

Southwick, Mass.—Citizens have voted to authorize Selectmen to enter into a contract with Southwick El. Lt. Co. for lighting the streets of the town.

Pass Christian, Miss.—Bond issue is being considered for installation of electric light plant.

Pickering, Mo.—Citizens have voted in favor of issuing bonds for purpose of installing municipal electric light plant.

Butte, Mont.—Resolution creating new street lighting district has been adopted by unanimous vote. City engineer explained that petition in protest represented but 40 per cent of property owners involved.

Blair, Neb.—Village Clerk is receiving bids for constructing municipal electric light plant.

Hastings, Neb.—Council has ordered a turbine generator for the electric plant.

Stuart, Neb.—Board of Trustees has passed ordinance authorizing issuance of electric light bonds in sum of \$12,000.

Batavia, N. Y.—City is considering increasing output of municipal electric light plant.

East Rochester, N. Y.—The question of ornamentally lighting Commercial St., from Madison to Washington Sts., and Main St. from Maple St. to Fairport Rd., is being considered.

Rochester, N. Y.—See "Miscellaneous."

Yonkers, N. Y.—Ninety-two additional lamps will be added to ornamental lighting system on Broadway. Lamps will be of same type and candle power as those now in use. Ordinance will also be introduced into Council authorizing erection of 12 ornamental lamps in Sherwood Park.

Hickory, N. C.—S. C. Cornwell, city manager, will receive bids until October for electric light and power franchise.

Rocky Mount, N. C.—Bonds in sum of \$15,000 have been voted for electric light extensions.

Minot, N. D.—City Commissioners have passed gas franchise ordinance. Probable cost of plant \$250,000.

East Liverpool, O.—Bonds will shortly be issued for construction of municipal electric light plant to cost about \$60,000. J. C. Kelley is city engineer.

Muskogee, Okla.—A committee of 100 business men has been named to arrange for city bond issue of \$200,000 to lay pipe line to gas field and secure cheap gas for manufacturing purposes.

Hazleton, Pa.—Council has passed ordinance authorizing installation of new lamps on various streets. Plans have been submitted for ornamental posts.

Williamsport, Pa.—Ordinance amending specifications for electric lighting has passed third reading.

CONTRACTS AWARDED.

Dowagiac, Mich.—To Westinghouse El. & Mfg. Co., of Pittsburgh, contract for installing engine generator and switchboard in electric light plant here at a cost of \$5,725.

Rochester, N. Y.—Contract for installing 9 lamps of Class N type in South Ave., from Court St. to Erie Canal, was awarded to Rochester Railway & Light Co. for \$821.25 a year. Same company was awarded contract for removal of light in Granger Pl., the price being \$100, and for installation and operation of six Class Q lights in Arnold Park, East Ave. to Park Ave., for \$407.99.

FIRE EQUIPMENT

Tustin, Cal.—Purchase of fire fighting engine to cost about \$500 is being considered.

Louisville, Ky.—Installation of large number of fire hydrants have been ordered.

Fall River, Mass.—A new fire company, with station in downtown district, is planned by Board of Fire Commissioners as part of general reorganization scheme to be put in operation when complete motorization of department is effected. A chemical, carrying two 60-gal. tanks and necessary hose and ladders, discarded when combination hose and chemical motor apparatus were purchased, will be utilized. Specifications already prepared for call for bids on complete motorization contain provision for a chassis for this chemical. Specifications prepared by Commissioners call for 14 pieces of motor equipment, instead of original 13 as planned. It is expected that bids will be called for early next week. Specifications will be in hands of Mayor within two days, and when his approval is given call will be sent out. There are \$85,000 now available for purchase of motor apparatus. There will be 19 pieces of apparatus traded in by Commission in deal for new apparatus and equipment. This includes two exercise wagons and other vehicles not now in active service.

Fall River, Mass.—Finance committee has recommended motorization of department to cost about \$84,000. W. C. Davol is Chief.

Atlantic City, N. J.—William H. Bartlett, Director of Public Safety, has been authorized to obtain bids at once for 4 motor-driven fire engines and 4 motor-driven combination chemical and hose wagons.

Paterson, N. J.—Resolution has been passed authorizing purchase of 4,000 ft. of new hose.

Swedesboro, N. J.—Citizens will vote shortly on question of issuing bonds for purchase of motor apparatus.

Woodridge, N. J.—Committee has been appointed to report on purchase of additional apparatus.

Newburgh, N. Y.—By unanimous vote, the City Council has adopted recommendation of fire department for special

taxpayers' election to be held at the Court House on Saturday, Oct. 9, to vote on question of expending \$18,500 for three pieces of motor-driven fire apparatus. The plan of committee is to secure a 500-gal. triple pumper, with a 40-gal. chemical pump, for Leonard Steamer; a tractor of at least 90 horsepower for Brewster Hook & Ladder Co., and a combination auto car for a company to be designated later.

Coshocton, O.—Automobile fire truck will be purchased shortly.

Dayton, O.—See "Miscellaneous."

Lima, O.—If City Council adopts recommendation of safety committee, to be made at next meeting, a bond issue for probably \$25,000 will be submitted at fall election for construction of new fire stations, one south of Chicago and Erie tracks, and other in East Lima. The equipment for both of stations will represent about \$8,500 of the total of \$25,000. Each station at present would have hose wagon and hose, two horses and harness, stable equipment and gong and indicator.

Troy, O.—Bids will shortly be opened for motorization of old hose and chemical truck of fire department.

Victoria, Tex.—Fire station to cost \$30,000 may be erected.

Waco, Tex.—Bids are being received by City Secretary Richards for supply of 2,000 ft. of fire hose.

Everett, Wash.—Purchase of runabout for Fire Chief is urged.

CONTRACTS AWARDED.

Haddonfield, N. J.—Contract for new motor fire apparatus for Haddonfield has been awarded to James Boyd & Bro., of Philadelphia, for \$4,875. The truck is to be delivered on November 12. The specifications call for a 6-cylinder 90-horsepower worm driven machine and Boyd Co. has added that if worm drive is not satisfactory they will install old spain drive free of cost.

Rahway, N. J.—Bids have been opened at meeting of the Common Council for purchase of 1,500 ft. of new hose for fire department and contract awarded to Eureka Fire Hose Co., of Jersey City, at 85 cts. per lin. ft., amounting to \$1,275, for Blue Diamond brand.

High Point, N. C.—The Eureka Fire Hose Co., of Atlanta, was awarded contract for 1,000 ft. of standard 2½-in. double jacketed hose at 90 cts. per ft. The B. F. Goodrich Co., of Akron, O., was also awarded contract for 1,000 ft. of interwoven hose at 80 cts. per ft., making total cost to the city of \$1,700 for the 2,000 ft. The hose are said to stand a 400-lb. pressure test and are guaranteed for period of three years. Hose upon arrival will be distributed among three companies to give them required amount of reserve.

BRIDGES

Oroville, Cal.—Board of Supervisors has ordered construction of sixteen bridges in Butte county, total cost to be about \$22,000. Bids will be opened on Sept. 1. Ten of bridges will be on the State Highway, between Nelson and Butte Creek. Eight of the ten will range from 20 to 120 ft. in length, the total cost to be \$12,000, and one bid will cover the work on all of the eight. Of the remaining two, one will be 100 ft. long, across the North Channel of Butte Creek, and the other, 40 ft. in length, will be built across Durham Slough. The two structures will cost \$4,500. Of remaining six structures, five will be small bridges in different road districts, the total cost to be \$2,500. The other will be a large structure to cost \$3,000, across Pine Creek, near the Cana Rd.

Bridgeport, Conn.—Stratford Ave. bridge bonds in sum of \$400,000 have been awarded to Sidney, Spitzer & Co. at premium of \$11,205.

Hartford City, Ind.—With improvement of Little Lick Creek by dredging, city will have to build two new bridges, one over creek at Jefferson St., and other at Spring St. Estimated expense of bridge at Jefferson St. is \$4,000. Spring St. bridge, it is estimated, will cost in neighborhood of \$2,000, all to be sustained by city.

Richmond, Ind.—County Council has appropriated \$6,500 for construction of temporary bridge at Main St.

Lancaster, Ky.—At special meeting of Fiscal Court, it was resolved to build and repair bridges, one to be built over White Lick creek, near Paint Lick, vote being made on petition from citizens from Paint Lick. The County Road En-

gineer was ordered to report to State Supervisor of Roads for estimates and specifications. An order was given for repairing of Buckeye pike bridge over Sugar creek and contract for replacing Lowell bridge over Herndon's branch was awarded to Joe Boelan for \$375.

Lexington, Ky.—Resident Engineer Kurzenknebe, of Louisville & Nashville Railroad, has turned over to Judge Bullock and County Road Engineer Davis preliminary plan and estimate for proposed new bridge at Clay's Ferry, which probably will be built jointly by Fayette and Madison counties. These plans are not definite in any particular, but are simply for use in considering approximate specifications and cost of new bridge. A Kansas City engineering firm has already submitted preliminary estimate which calls for somewhat larger expenditure than Kurzenknebe's plans. The Kansas City firm quoted \$175,000 as cost of their type of bridge, while local man quotes his at \$149,000. Length of bridge will be in neighborhood of 1,200 ft., and according to Mr. Kurzenknebe's plans will be 24 ft. wide with concrete floor. The Madison County Fiscal Court already has asked that Fayette Fiscal Court appoint committee to co-operate with their committee and consider matter of new bridge. The committee from Fayette will be appointed at next meeting of Fiscal Court.

Blghamton, N. Y.—After general inspection of roads throughout town, town board of Fenton decided to issue certificates of indebtedness to extent of \$3,000 to make necessary repairs to bridges and highways in town damaged by flood early last month.

Columbus, O.—Bids will be received until 12 noon, Sept. 7, for purchase of Franklin County Emergency Bridge bonds in sum of \$100,000. John Scott is Clerk of Board.

Dayton, O.—A favorable vote has been taken by City Commissioners on ordinance authorizing issuance of bonds in amount of \$338,000 for reconstruction of 5th St. bridge over Miami and Webster St. bridge over Mad River, both of which were destroyed during 1913 flood.

Dayton, O.—See "miscellaneous."

Girard, O.—Village council has gone on record as favoring construction of foot bridge over tracks of Erie Railroad and Pennsylvania lines opposite Hancock or Abbey Sts., and connecting with district known as the flats.

Marion, O.—County bridge bonds in sum of \$32,000 will be sold at noon, Sept. 7.

Tiffin, O.—County Commissioners have opened bids for 12 bridge improvements. Philip H. Reif was low bidder and was awarded the contracts Aug. 23.

Pittsburgh, Pa.—A movement which looks to building of another new bridge across Allegheny will be launched shortly. It is one of projects contemplated by 26th Ward Board of Trade, which is now in process of formation. Proposed bridge would have its Northside terminal at Ohio and East Sts., and its Pittsburgh approach would begin near Union Station at 12th St. Easy access between upper Northside and Grant Blvd. is sought.

Knoxville, Tenn.—The Knox County Good Roads Commission will take up and pass upon bridges which it will construct out of \$500,000 bond issue and will also make needed repairs on Boyd's bridge across river.

Benjamin, Tex.—Knox County has voted \$50,000 bonds to construct two bridges over Brazos River, one at Brock Crossing and other at Coffman Crossing.

Llano, Tex.—Llano County will vote shortly on \$20,000 bonds to construct 4 bridges.

Milwaukee, Wis.—County will build concrete bridge over Root river, town of Franklin, on Kilbourn Rd. A committee of County Board has recommended that contract be let to Joe Ubbick, whose bid of \$9,704 was lowest among four bidders. Bridge will have two spans of 60 ft. clear opening, and with a 26-ft. clear roadway. Two hundred and ten lin. ft. of concrete will be laid. City of Cudahy has appropriated \$2,000 for improvement of Packard Ave. from Layton Ave. to north city limits, and has asked county to bear remaining expense of improvement.

CONTRACTS AWARDED.

El Dorado, Cal.—The El Dorado Supervisors have awarded to Bluxon & Co., of Oakland, the contract for the construction of a steel truss bridge across the South Fork of the American River

at Coloma. The accepted bid was \$11,470, including a bituminous surface and \$11,250 without such a surface.

Placerville, Cal.—Supervisors have awarded contract for construction of steel truss bridge across South Fork of American River at historic town of Coloma to Bluxon and Company of Oakland. Bid submitted by them was \$11,470, including bituminous surfacing, or \$11,250 without such a macadam. Construction work will be started as soon as old wire suspension foot bridge connecting Coloma proper with North Coloma can be removed. Five other bids were submitted as follows: C. E. Cotton of Oakland, \$11,270; Jenkins & Wells, \$12,230; John Spargo, \$13,490; Clinton Bridge Company, \$14,110; C. H. Gorrell, \$14,900.

Hartford, Conn.—To McHarg-Barton Co., 171 Madison Ave., New York City, N. Y., contract by State Highway Commission for construction of reinforced concrete bridge over Saugatuck River in town of Westport. The company bid \$96,858 for granite rubble; \$101,163 for granite ashlar and \$101,163 for brown stone.

Richmond, Ind.—Although County Council at previous session had only appropriated \$15,000 for new concrete bridge at North 12th St., it was found necessary to make additional appropriation of \$5,990 in order to award contract to lowest bidder. As result of small appropriation for the work, only two firms presented bids to Council. Bid of I. E. Smith was \$18,000, exclusive of piling. His was lowest bid and contract was awarded to him. On bid of \$23,000 Contractor Smith was also awarded building of three other bridges in county. They were Short Creek bridge, on which he was only bidder, the Centerville bridge and McConeha bridge. Total contract price for these three bridges is \$4,620.

Berlin, N. H.—Contract for superstructure of new bridge has been awarded to Boston Bridge Works of Boston, Mass., at \$21,532, and for masonry of new bridge to H. P. Cummings Const. Co. of Ware, Mass., at \$9,700.

Elizabeth, N. J.—Five contracts were given out Aug. 23 at meetings of committees of Board of Freeholders, two being for new bridges, one for repairs to old bridge and two for construction of culverts. Bids of T. Foster Callahan were lowest for new bridges and he was awarded both contracts. One will be built over Brook on the new Shunpike Rd., near Morris Ave., between Summit and Springfield at a cost of \$1,129. The other bids were as follows: Louis Di Francesco, \$1,144.50; W. L. Oaks & Co., \$1,150; Camilla Massa, \$1,550; Robert Wenz, \$1,300; Camilla Villa, \$1,332. Other will be constructed over brook on old Shunpike Rd. at Foster property, near Morris Ave., between Springfield and Summit, at a cost of \$974. The other bids were: Louis Di Francesco, \$1,095; Camilla Massa, \$1,145; W. L. Oaks & Co., \$1,050; Robert H. Morrison & Son, \$1,595, and Camilla Villa, \$1,110.50. The contract to repair walls of bridge at Inman Ave., Rahway, was awarded to Robert Wenz for \$245. Wilfred A. Cole was granted contract for construction of three cast-iron covered culverts in Roselle, his bid of \$476 being the lowest. A contract for construction of a new cast-iron covered culvert, crossing Halsey Rd. at First St., Roselle, was awarded to Mr. Callahan for \$164.

Summit, N. J.—D. Foster Callahan on Aug. 23 received contract by bridge committee of Union County Board of Freeholders for erection of two bridges near Commonwealth quarry to replace those carried away by storm Aug. 4. Contract price for one bridge was \$970 and for other \$1,029. Work will be started at once.

Sulphur, Okla.—By Murray County Commissioners to Western Bridge Co., of Sherman, Tex., to construct 2 bridges over Washita River.

Pittsburgh, Pa.—Contract was awarded Aug. 25 by County Commissioners for repairs to county bridge No. 6 on Youghiogheny River at Boston, to C. M. Haggart, whose bid was \$18,425, the lowest of ten. The work will require building of new approach to bridge, a new wood block floor and new street car rails.

Knoxville, Tenn.—Contracts have been let for bridges over Gap creek and on Prater's Ferry Rd. at cost of \$460.50 and \$357.50 respectively, by Knox Co. Road Commission. J. W. Bye was awarded Gap creek bridge contract, and Donocan, Doughty & Taylor that of bridge on Prater's Ferry Rd.